

7.0 CUMULATIVE EFFECTS

7.1 INTRODUCTION

Cumulative effects, as defined in 50 CFR Section 402.02, “are those effects of future state or private activities, not involving Federal activities that are reasonably certain to occur within the action area.” Future Federal actions require separate consultations pursuant to Section 7 of the Endangered Species Act (ESA) and are therefore not considered here. As indicated in Section 1.2.4 of this Opinion, the consultation regulations require that the effects of the action, including those of the environmental baseline, be considered together with any cumulative effects when determining jeopardy or adverse modification of critical habitat. See 50 CFR § 402.14(g).

There are two specific directives in this definition. One is that NOAA Fisheries focus its consideration of cumulative effects on those occurring in the action area, as defined in Section 5.1.1 of this Opinion. The second is that NOAA Fisheries only consider future State and private actions that are “reasonably certain to occur.” Thus NOAA Fisheries must “consider the cumulative effects of those actions that are likely to occur, bearing in mind the economic, administrative, or legal hurdles which remain to be cleared.” This was explained in the preamble to the final rule adopting the definition and use of cumulative effects in a jeopardy analysis (51 Fed.Reg. 19926 at 19933). The rule also stated that this standard “does not mean that there is a guarantee that an action will occur.” Instead, the rule explained that “(f)or State and private actions to be considered in the cumulative effects analysis, there must exist more than a mere possibility that the action may proceed.” *Id.*

The Consultation Handbook prepared jointly by NOAA Fisheries and the FWS provides an example of a cumulative effects analysis regarding “natural gas development” that was occurring within the action area. “Future natural gas development is a cumulative effect as it is regulated by the State. The frequent occurrence of new drilling sites in the area indicated that this activity was “reasonably certain to occur” in the future. Further, several landowners in the action area had recently signed contracts to sell their mineral rights to gas companies.” Joint Handbook (at 4-31). Thus, the frequency of occurrence is an additional factor, but not a dispositive factor, in evaluating whether the cumulative effect is reasonably certain to occur.

The significance of the cumulative effects element of the jeopardy and adverse modification of critical habitat analysis is indicated by its function; the effects of the proposed action must be “taken together with cumulative effects” 50 CFR Section 402.14(g)(4). Thus, when evaluating the future effect of the proposed action, NOAA Fisheries must also consider the expected future effects of qualifying state and private activities together with the future effects of the environmental baseline, which also includes the likely future effects of Federal actions that have undergone ESA Section 7(a)(2) analysis (Section 1.2.2). What this also means, of course, is that NOAA Fisheries is not to consider the effects of any future state and private activities that are not “reasonably certain to occur” or are occurring outside the action area.

NOAA Fisheries has found from its evaluation of state and private activities in the environmental baseline that the habitat features important to salmon in the watersheds within the action area

were historically limited by such activities (see Section 5.0). Although these activities occurred in the past, their continuation in the future may depend upon the certainty of funding or the renewal of government authorization to satisfy the “reasonably certain to occur” test. In the absence of a record to support a finding that these actions are reasonably certain to occur, NOAA Fisheries must presume that these activities that have occurred in the past, and have limited the survival and productivity of the listed ESUs are not necessarily going to occur in the future. Based on the best available science, NOAA Fisheries would conclude that the condition of these watersheds will substantially improve in the coming years without the limiting effects of these activities.

The analysis in this chapter, therefore, is first to determine, on the available record, what future state and private activities are reasonably certain to occur in the action area and then to consider how those activities are likely to change the continuing effects of the environmental baseline. The overall objective of the analysis of the environmental baseline and cumulative effects is to get a picture of the conditions in the action area likely to occur without the proposed action and, therefore, to which the effects of the action would be added.

7.2 CUMULATIVE EFFECTS INVESTIGATION

In a memorandum dated November 26, 2003 (NMFS 2003c), NOAA Fisheries asked the state and Tribal fisheries Comanagers for help in discovering any non-Federal actions in the action area for this consultation that would affect listed fish or their habitat in either a positive or negative manner and were reasonably certain to occur. The Comanagers were asked to consider the following as indicators of actions that were reasonably certain to occur: approval of the action by state, Tribal, or local agencies or governments (e.g., permits, grants); indications by state, Tribal, or local agencies or governments that granting authority for the action is imminent; the project sponsors’ assurance that the action would proceed; obligation of venture capital; or initiation of contracts. The Comanagers were also asked to consider the following questions:

- Has adequate funding been secured, or is there written documentation demonstrating that funding is imminent?¹
- Have needed authorizations and/or permits been obtained, or is there written documentation demonstrating that such authorizations and permits are imminent?
- Is there other evidence, such as agreements, issued contracts, or other binding commitments, that demonstrates the action is “reasonably certain to occur,” despite a lack of authorization or funding?

These situations were to be considered on a case by case basis.

The Nez Perce Tribe responded with a list of actions. The State of Idaho provided a summary, which included the conservation agreements for the Lemhi and Upper Salmon subbasins. These conservation agreements described partnerships to address land and water needs in the basins of the Salmon River drainage. Parties to the agreements intend to participate in a long-term

¹ NOAA Fisheries has included projects that were submitted for financial support from the Pacific Coast Salmon Restoration Fund as part of the environmental baseline.

Federal/state program for the conservation of fish and fish habitat, in which individuals may voluntarily participate and receive, in return, appropriate incidental take authorization and protection under the ESA for activities associated with water diversion. Although significant conservation benefits may flow from these voluntary agreements, the implementation of specific actions with immediate benefit to salmonids has not progressed to the point where they can be included within the cumulative effects analysis. The State of Washington referred NOAA Fisheries to its salmon recovery Web site (<http://www.governor.wa.gov/gsro/sosreport/2002/partthree.pdf>), which identifies projects, plans, and assessments proposed, developed, or implemented by the State of Washington through 2001. Although direct or indirect conservation benefit is likely to accrue from the listed projects that are reasonably certain to occur, there is, in the aggregate, insufficient information to conclude a measurable change in status of the ESU or in the condition of the environmental baseline in the action area. The State of Oregon stated that all its actions had been previously reported under the Pacific Coast Salmon Recovery Fund (PCSRF) reporting requirements. PCSRF-funded projects have a Federal nexus, which requires consultation under Section 7 of the ESA. Thus, the potential benefits of many future projects in the state of Oregon are considered in Section 5.0 in this Opinion.

In a separate effort, NOAA Fisheries collaborated with technical contacts from the states and Tribes to review information that local subbasin planners had developed for the Northwest Power Planning and Conservation Council's Subbasin Planning Process. These subbasin summaries and assessments describe both adverse and beneficial ongoing and future actions. Additionally, NOAA Fisheries reviewed available state, tribal and local subbasin and watershed plans, assessments and initiatives in order to anticipate the implementation of actions and their effects on the environmental baseline.

This investigation did not identify particular future, non-federal projects with specific documentation that they could be considered "reasonably certain to occur." However, NOAA Fisheries was able to discern some indications of cumulative effects based on an analysis of frequently occurring activities such as water withdrawals pursuant to senior state water rights. As explained above, the mere fact that an activity frequently occurred in the past is not dispositive of whether it is reasonably certain to occur in the future. That depends on the "economic, administrative or legal hurdles which remain to be cleared." (51 Fed.Reg. 19926 at 19933). However, frequent past occurrence is evidence that some level of activity is likely to continue into the future at least in the short term until current authorizations and funding expire. Although these historical and continuing non-federal activities are likely to contribute cumulative effects in the future, the ability of NOAA Fisheries to reasonably foresee them diminishes as they are projected into the future. They are most certain to occur in the immediate future, but the longer term becomes increasingly uncertain.

Similarly, for all ESUs, State, Tribal, and local governments there are programs that harm salmon habitat through legislation, administrative rules, policy initiatives, or permitting activities. Despite the fact that none of the States or Tribes provided evidence of specific harmful programs in their responses to the request for information from NOAA Fisheries, it is self evidence that many of the programs exist and contribute to the currently degraded status of the ESUs, as described in Sections 4.0 and 5.0. These harms are reasonably certain to occur and will

continue to degrade salmon habitat at least as long as the current authorizations for these activities last. Given the vast breadth of these harmful activities across all ESUs, it is impossible for NOAA Fisheries to provide anything more than a general analysis of their effects absent additional assistance from State, Tribal or local governments to identify these authorizations. NOAA Fisheries cannot presume that the current authorizations for these harmful effects will be renewed once they expire and, therefore, NOAA Fisheries must by law assume that the habitat will gradually approach a more pristine condition at some point in the future as these harmful activities cease. However, such eventual habitat improvements would likely not significantly effect these ESUs until after the term of this Opinion expires in 2014.

7.3 CUMULATIVE EFFECTS

As discussed in Section 5 for the Environmental Baseline, the action area for many of these affected ESUs includes all tributary subbasins to which adult fish return and therefore are potentially affected by a reduction of marine-derived nutrients. The subbasins evaluated for cumulative effects in detail in the following sections are those subbasins that will also be affected by conservation measures the Action Agencies are proposing as part of their Updated Proposed Action. Generally, NOAA Fisheries observed that the types of cumulative effects are likely to be similar across the subbasins of the action area with comparable types of habitats. These subbasins, discussed below, are generally representative of the remaining subbasins with similar habitat and land use. Appendix E, the Limiting Factors Analysis, prepared to guide the development of the UPA, further informs this evaluation of the potential for cumulative effects in the tributary habitat. The subbasins not discussed below are evaluated in Appendix E. For the purposes of this biological opinion the effects of these representative subbasins, described below, are extrapolated to all subbasins for the purposes of this cumulative effects analysis.

7.3.1 Mid-Columbia River Steelhead

7.3.1.1 John Day River

As discussed in Section 5.0, Environmental Baseline, the John Day Subbasin is an overwhelmingly rural area with relatively low populations. Many of these towns were historically sawmill towns. Large mills remain today in John Day and Prairie City. Over 95% of the lands within the subbasin are zoned for agriculture and forestry. Private and Federal lands are used mainly for livestock grazing and forage production. Urban lands make up only 0.3% of the land base. Ownership of the John Day Subbasin is 59% private, 31% USFS, 9% BLM/miscellaneous Federal, and 1% state. Private ownership is primarily in the lower subbasin. The USDA Forest Service manages much of the higher elevations in the subbasin. The Umatilla, Wallowa-Whitman, Malheur, and Ochoco national forests together make up 31% of the subbasin's total area. There is an increasing trend towards fragmentation of large private land holdings and associated rural development, ranging from hunting cabins to small subdivisions. Water withdrawals have reduced streamflows, especially during summer, and contribute to higher water temperature. Grazing, mining, timber harvest, and maintenance of pushup dams have reduced riparian vegetation and shade, also contributing to higher water temperatures and reducing habitat diversity. Pushup dams and reduced flows have created physical and thermal obstacles to fish movement. The John Day Subbasin, particularly along the Upper Mainstem and South Fork

John Day rivers, experienced numerous and intensive stream channelization, flow modification and drainage (including some tiling of drainage ditches) projects between 1943 and 1951.

Significant improvement in Mid-Columbia River (MCR) steelhead reproductive success outside of Federally administered land is unlikely without changes in grazing, agricultural, and other practices occurring within non-Federal riparian areas in the JDR basin.

7.3.1.1.1 Upper John Day. See 7.3.1.2

7.3.1.1.2 Middle Fork John Day. See 7.3.1.2

7.3.1.1.3 North Fork John Day. Road building and maintenance, timber harvest, mining, livestock grazing, and agriculture are all considered significant threats to MCR steelhead due to the lack of adequate regulatory control over these activities and uncertainty about their potential effects. In addition to the mining that occurs on Federal lands in the action area, there is also a significant amount of mining occurring on private lands throughout the watersheds of the NFJDR subbasin. The Granite Creek watershed includes the Alamo Mining District, which is characterized by many placer and lode mines. The extent of private mining actions is not specifically analyzed here, but field reviews by NOAA Fisheries biologists suggest that a significant amount of private land mining activity still takes place and is foreseeable for the future.

Another non-Federally regulated activity that takes place in the Granite Creek, Upper NFJDR, and NFJDR watersheds is small-scale recreational suction dredging. Although this activity is regulated by the State of Oregon, it can still have adverse effects on MCR steelhead or their habitat. The presence of a small number of recreational dredges would not likely disrupt stream processes, but the combined effects of a large number of recreational dredges operating in a stream within a single season could have significant adverse effects. NOAA Fisheries foresees continuing effects from these activities.

7.3.1.2 Umatilla

Economic diversification has contributed to population growth and movement, primarily in Morrow County. From April 1, 2000 to July 1, 2001, the population of Morrow County increased by 3.1%, while the state population increased only 1.5%. However, the population of Umatilla County increased by only 0.3%, and the population of Union County decreased by 0.8%. Increasing population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area. It will also affect water quality directly and indirectly and increase the need for transportation, communication, and other infrastructure.

The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will likely be negative, unless carefully planned for and mitigated which, at this point, is uncertain.

Agriculture plays a major role in the basin. Irrigation water withdrawal from the Umatilla River and its tributaries at non-Federal facilities is a prominent activity in the basin and will likely continue to occur. Water withdrawal greatly reduces water quantity and quality in the lower Umatilla River, limiting adequate summer rearing conditions to spring-based refugia and resulting in habitat conditions insufficient to support migrating adult steelhead. In addition to affecting water quantity and quality, flow diversions also affect other key habitat components, including water temperature, passage, substrate, sediment transport, food production, and space. NOAA Fisheries assumes that future private and state actions will continue at similar intensities as in recent years and, as a result, will maintain degraded MCR steelhead habitat conditions on non-Federal land (NOAA Fisheries 2004h).

7.3.1.3 Yakima

The mainstem Yakima River and other Yakima basin tributaries are generally over-appropriated. This condition is unlikely to worsen as the State of Washington continues to clarify water rights through the adjudication process. Furthermore, the state is engaged, through the departments of Ecology and Fish and Wildlife and the Benton County Conservation District, in programs to improve instream flows in the lower Yakima River and its tributaries. If successful, such programs may improve water quality and quantity and riparian habitat in the lower Yakima basin.

The WDFW and Tribal Comanagers have been implementing the Wild Stock Recovery Initiative since 1992. The Comanagers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The State of Washington is under a court order to develop TMDL management plans for each of its 303(d) water-quality-listed streams. It has created and annually updates a schedule that outlines the priority and timing of TMDL plan development. Washington closed the mainstem Columbia River to new water rights appropriations in 1995 but lifted this moratorium in 2002. The state has proposed to mitigate the effects of new appropriation by purchasing or leasing replacement water when Columbia River flow targets are not met. The efficacy of this program is unknown at the present time.

It is expected that a range of non-Federal activities would occur within the Yakima River Basin for the purposes of restoring and enhancing fish habitat. These activities would likely include installing fish screens, improving flow management and irrigation efficiency, restoring instream and riparian habitat, and removing barriers to passage. Although the specific details of individual projects are lacking, it is assumed that non-Federal conservation efforts would continue or increase in the near future.

7.3.1.4 Deschutes

The only known state or private activities that are foreseeable within the Deschutes basin are future grazing and agricultural activities on private land within the action area. Significant improvement in MCR steelhead reproductive success outside of Federally administered land is unlikely without changes in grazing, agricultural, and other practices occurring within non-Federal riparian areas in the Deschutes Basin. Until improvements in non Federal land management practices are actually implemented, NOAA Fisheries assumes that future private

and state actions will continue at similar intensities as in recent years and as a result will maintain degraded MCR steelhead habitat conditions on non-Federal land.

7.3.2 Upper Columbia Steelhead and Spring/Summer Chinook

The State of Washington has various strategies and programs designed to improve the habitat of listed species and assist in recovery planning. Washington's 1998 Salmon Recovery Planning Act provided the framework for developing watershed restoration projects and established a funding mechanism for local habitat restoration projects. The Watershed Planning Act, also passed in 1998, encourages voluntary planning by local governments, citizens, and Tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. WDFW and Tribal Comanagers have been implementing the Wild Stock Recovery Initiative since 1992. The Comanagers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The state is also establishing the Lower Columbia Fish Recovery Board to begin drafting recovery plans for the lower Columbia region.

Water quality improvements will be proposed through development of TMDLs. The State of Washington is under a court order to develop TMDL management plans on each of its 303(d) water-quality-listed streams. It has created and annually updates a schedule that outlines the priority and timing of TMDL plan development. These efforts should help improve habitat for listed species, although future implementation of TMDLs is not sufficiently certain to qualify as cumulative effects. Washington closed the mainstem Columbia River to new water rights appropriations in 1995 but lifted this moratorium in 2002. The state has proposed to mitigate the effects of new appropriation by purchasing or leasing replacement water when Columbia River flow targets are not met. The efficacy of this program is unknown at the present time.

7.3.2.1 Methow

Generally, local conservation efforts and habitat restoration projects will continue to improve conservation and restoration of spring chinook salmon and steelhead habitat on non-Federal land in the region of the proposed action. Furthermore, improvements such as infrastructure upgrades planned for other water diversions in the Chewuch and Methow basins will probably reduce the contribution of those diversions to future habitat degradation.

Other non-Federal diversions in the Chewuch River contribute to adverse effects on instream flows for fish. For example, the two other sizable diversions are Chewuch Canal (31 cfs) and Fulton Canal (20 cfs) located downstream of the Skyline Ditch at RM 8.0 and RM 0.7, respectively. Because these diversions do not constitute a Federal action, no ESA consultation will be done and withdrawals in accordance with established water rights are expected to continue at similar levels into the immediate future with associated effects. However, the above-mentioned entities, together with the Skyline Ditch Company, have formed the Chewuch Basin Council to cooperatively seek efficiency improvements to their water delivery systems and to seek flow plan and habitat improvements to maintain adequate instream flows although the likely effects of their efforts are too uncertain for this analysis.

Existing studies report that conversion of water use from irrigation to domestic use is related to real estate development in the Methow Basin (Peterson and Jackson 1990; EMCON 1993; Methow Valley Planning Committee 1994). Continuing real estate development (especially for residential use) is expected to continue into the foreseeable future. The precise effects of expected development on in-stream flows during low flow periods, late summer/early fall and winter, have not been documented. However, estimates from these reports show that if only six percent of the saved water from total irrigable acres in the basin (12,900 acres) is converted to domestic use, an additional 950 homes could be built in the basin, which could support approximately 2,800 people. The basin's current population is only about 4,500. Using water saved from irrigation to support development in the face of an expanding population in the basin will maintain habitat that is not properly functioning to adequately meet the biological requirements of the listed ESUs.

7.3.2.2 Entiat

Current land uses within the Entiat include agriculture (primarily pear and apple orchards), livestock production and grazing, timber harvest, residential housing, and recreation. The U.S. Forest Service (USFS) manages approximately 83% of lands within the subbasin. Wilderness, old growth reserves, wildlife and riparian reserves make up 63% of the USFS land designation, which includes some areas in the lower valley that currently do not fall within the other land use categories. Irrigated agriculture land area is 0.4% of the watershed and, with developed recreation areas (including trails) and residential areas, makes up approximately 1% of the total land area, most of which is along the riparian corridor. The Entiat River Subbasin Salmon and Steelhead Production Plan identified water withdrawals, both agricultural and domestic, as an issue of concern relative to their potential to exacerbate normal low flows of late summer in the Entiat River (NWPPC 2004d). NOAA Fisheries finds that continued water diversion at existing rates is reasonably foreseeable for the immediate future.

7.3.2.3 Wenatchee

In many watersheds, land management and development activities have: reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; elevated fine sediment yields, degrading spawning and rearing habitat; reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; reduced vegetative canopy that minimizes solar heating of streams; caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and altered floodplain function, water tables, and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; NRC 1996; Spence *et al.* 1996; and Lee *et al.* 1997). Agricultural activities are presently the main land use in the action area. Summer low flows are modified by irrigation diversions, and riparian buffers contain little woody vegetation. Consistent instream flows are essential for fish survival. Riparian habitat is essential to salmonids in providing and maintaining various stream characteristics such as channel stabilization and morphology, leaf litter, and shade. Given the patterns of riparian development in the action area and rapid human population growth of Chelan

County (27.5% from 1990- 2000, per the U.S. Census Bureau), it is foreseeable that some riparian habitat will be impacted in the future by non-Federal activities.

The State of Washington has various strategies and programs designed to improve the habitat of listed species and assist in recovery planning. Washington's 1998 Salmon Recovery Planning Act provided the framework for developing watershed restoration projects and established a funding mechanism for local habitat restoration projects. The Watershed Planning Act, also passed in 1998, encourages voluntary planning by local governments, citizens, and Tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. Washington's Department of Fish and Wildlife and tribal Comanagers have been implementing the Wild Stock Recovery Initiative since 1992. The Comanagers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The state is also establishing the Lower Columbia Fish Recovery Board to begin drafting recovery plans for the lower Columbia region. Water quality improvements will be proposed through development of Total Maximum Daily Loads (TMDLs). The State of Washington is under a court order to develop TMDL management plans on each of its 303(d) water-quality-listed streams. It has developed a schedule, which is updated yearly, that outlines the priority and timing of TMDL plan development. These efforts should help improve habitat for listed species although there is not currently enough certainty to include them in this analysis as cumulative effects. Washington closed the mainstem Columbia River to new water rights appropriations in 1995 but lifted this moratorium in 2002. The state has proposed to mitigate the effects of new appropriations by purchasing or leasing replacement water when Columbia River flow targets are not met. The efficacy of this program is also unknown at this time (NOAA Fisheries 2003d).

7.3.2.4 Okanogan

Between 1990 and 2000, the population of Okanogan County, Washington increased by 18.6% (US Census Bureau 2003). Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, increasing as population density rises. As the human population in the action area continues to grow, demand for agricultural, commercial, or residential development is also likely to grow. The effects of new development caused by that demand are likely to further reduce the conservation value of habitat within the action area.

7.3.3 Snake River Spring/Summer Chinook, Steelhead and Sockeye

7.3.3.1 Upper Salmon, Little Salmon, Lemhi

Non-Federal actions are likely to continue affecting ESA-listed fish species. The cumulative effects in the action area are difficult to analyze, given the broad geographic landscape covered by the action area, the uncertainties associated with non-Federal actions, and ongoing changes to the region's economy. Whether those effects will increase or decrease in the future is not known; however, based on the subpopulation and growth trends identified in this section, the adverse effects of non-Federal actions are likely to increase. NOAA Fisheries expects the environmental baseline to remain static or decrease slightly due to ongoing non-Federal actions. Predominant ongoing activities on state, Tribal, and private lands include timber harvest, range management

and grazing of domestic livestock, and road construction. Land uses also include limited amounts of cultivation and irrigation of hay fields and pastures, water diversions, and residential development. State laws regulate these activities.

State-administered logging and grazing is expected to contribute short-term adverse effects to spawning, rearing, and migration conditions for anadromous species.

Grazing on state land is currently operated under Best Management Practices (BMPs) established under Grazing Management Plans overseen by the IDL. Grazing BMPs, as identified in the Idaho State Agricultural Pollution Abatement Plan (State Plan), are not mandatory but are recommended for private lands. Because compliance with the State Plan is not required on private lands, no monitoring plan is in place to evaluate potential direct and indirect impacts on ESA-listed fish species or designated critical habitat.

The populations of urban areas within the action area have been growing rapidly and are predicted to continue to grow. Rural areas, on the other hand have been fairly static, and populations are predicted to remain static or increase at a slower rate. As populations increase in urban and rural areas, Federal land ownership is likely to change little; therefore, it will be up to private and state lands to absorb the increase in population. However, effects from non-Federal lands are expected to be highest for chinook salmon and steelhead in the Little Salmon subbasin, which has a relatively high percentage of non-Federal land (31%). Effects on steelhead, sockeye, and chinook salmon in the Upper Salmon subbasin are also expected to be high. Although a much lower percentage of private and state lands are found in that subbasin, a wide variety of land uses occur and are expected to continue to occur.

Home and business construction is likely to continue along the Lemhi River along with agricultural use of the surrounding lands. Numerous water diversions from the Lemhi River and its tributaries alter the river's natural hydrograph and will likely continue to do so into the future. Potential adverse effects caused by these ongoing private activities could impact the suitability of habitat for chinook salmon and steelhead. The effects of these activities may include sediment delivery into the river from private roads, chemicals leaching into the river from yards or livestock pastures, livestock grazing that damages the riverbank or removes riparian vegetation, or low flow periods that reduce fish passage. There are some private landowners seeking opportunities to alter agricultural practices or improve equipment to reduce negative impacts on ESA-listed salmonids; these efforts will likely result in beneficial effects to chinook and steelhead habitat. However, NOAA Fisheries is not currently able to consider these as cumulative effects, because they are not yet reasonably certain to occur.

The IDEQ has established TMDLs in the Snake River basin, a program likely to have positive water quality effects. The TMDLs are required by court order. The Lemhi Subbasin has a TMDL that addresses water quality on the Lemhi River and seven tributary streams. The primary Lemhi River TMDL water quality concern is fecal coliform bacteria (IDEQ 1999). The State of Idaho has created an Office of Species Conservation to work on subbasin planning and to coordinate the efforts of all state offices addressing natural resource issues. Demands for Idaho's groundwater resources have caused groundwater levels to drop and reduced flow in springs for which there are senior water rights. The Idaho Department of Water Resources has begun studies

and promulgated rules that address water right conflicts and demands on a limited resource. The studies have identified aquifer recharge as a mitigation measure with the potential to affect the quantity of water in certain streams, particularly those essential to listed species.

Snake River spring/summer chinook are known to spawn and rear in the Snake River mainstem. This area is discussed below in 7.3.4.2, Snake River Mainstem.

7.3.4 Snake River Fall Chinook

7.3.4.1 Clearwater

Land use in the Clearwater includes agricultural, timber harvest, roads, development, recreation, mining, and livestock grazing. Current levels of these uses are likely to continue, but detailed information on non-Federal activities in the action area is not available. Livestock grazing may partially thwart weed control efforts. Cattle can spread weeds through their droppings and create conditions that increase the likelihood that invasive weeds will out-compete native plants. Riparian cattle grazing on non-Federal lands is likely to affect water temperature and water quality in portions of the action area.

Impaired water quality from ongoing agricultural activities is likely to be one of the largest effects present in the action area. Cultivated croplands are likely to produce large amounts of sediment and increase water yield, and relatively large amounts of pesticides are also likely to be applied to croplands in the action area. City, state, and county governments also have ongoing weed spraying programs with less stringent measures to prevent water contamination. Weeds are sprayed along road right-of-ways annually by city, state, and county transportation departments, sometimes several times a year. NOAA Fisheries staff have observed county road crews spraying herbicides on streambank vegetation and directly into the water in Clearwater and Idaho counties, and it is probable that similar practices will continue.

7.3.5 Lower Columbia River Coho and Upper Willamette River Steelhead

7.3.5.1 Tualatin

A wide variety of activities occur in the portion of the action area that is within the Tualatin River basin. These activities have the potential to impact fish and habitat within the action area. Continued urban development and ongoing agricultural practices including water diversions will affect the water quality and hydrology. A continuing trend of high summer temperatures, higher discharges of flows immediately following storm events, and lack of habitat structure in the Tualatin River to dissipate energy are expected. Future Federal actions, including the ongoing operation of the Tualatin River flood control system, hatcheries, fisheries, and land management activities, will be reviewed through separate Section 7 consultation processes.

Between 1990 and 2000, the population of Washington County, Oregon increased by 42.9% (U.S. Census Bureau 2003). Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, increasing as population density rises. As the human population in the action area continues to grow, demand for agricultural, commercial, or

residential development is also likely to grow. The effects that new development that are caused by that demand are likely to further reduce the conservation value of habitat within the action area.

NOAA Fisheries is not aware of any specific future non-Federal activities within the action area that would cause greater impacts to listed species than those that are ongoing now. NOAA Fisheries assumes that future private and state actions will continue at similar intensities as in recent years.

7.3.5.2 Cumulative Effects Common to Multiple ESUs

7.3.5.3 Estuary and Columbia River Mainstem

Columbia River Estuary and mainstem are part of the Federal Navigation System. Most future actions in this area will have a Federal nexus and require consultation. Therefore, future actions are not evaluated under cumulative effects. At this time, NOAA Fisheries is not aware of any reasonably foreseeable future non-Federal activities within these areas that would cause greater effects to listed species than presently occurs.

7.3.6 State Managed Recreational Fisheries

The states of Idaho, Oregon, and Washington conduct recreational fisheries in tributaries to the Snake River that target marked hatchery fish. Incidental mortality from the catch and release of unmarked listed steelhead is estimated at 3.2% in Idaho. Recreational fisheries for spring/summer chinook salmon in Idaho are managed based on the number of natural-origin spring chinook salmon that escape above Lower Granite Dam (Table 7.1).

Table 7.1. Expected harvest rates for listed Snake River spring/summer chinook salmon in Idaho recreational fisheries.

Lower Granite Dam Predicted Return of Naturally Produced Listed Spring Chinook	Maximum Percent of Naturally Produced Spring Chinook Mortality for Idaho Recreational Fishery	Range of Potential Incidental Mortalities (Number of Fish)	Estimated Total Take (catch and release)
< 2,800	0%	0	-
2,800 to 4,500	0.25%	7 to 11	70 to 110
4,501 to 10,000	0.5%	22 to 50	220 to 500
10,001 to 15,000	0.75%	75 to 112	750 to 1,120
15,001 to 20,000	1.0%	150 to 200	1,500 to 2,000
20,001 to 25,000	1.5%	300 to 375	3,000 to 3,750
> 25,000	2.0%	>500	>5,000

Ongoing recreational fisheries are conducted in the upper Columbia River that affect listed salmon and are summarized in Tables 7.2 and 7.3.

Table 7.2. Authorized annual take level of ESA-listed species as a result of recreational fisheries implemented by the Washington Department of Fish and Wildlife in the Columbia River Basin upstream of Priest Rapids Dam, 2000-2004.

Fishery	UCR spring chinook				UCR steelhead ¹			
	Juvenile		Adult		Juvenile ²		Adult	
	Take	Mortality	Take	Mortality	Take	Mortality	Take	Mortality
Methow River trout fishery	870	44	1	0	3000(h) 9500(n)	150(h) 475(n)	10	1
Mainstem Columbia River summer/fall chinook fishery	0	0	0	0	0	0	25	3
Icicle Creek spring chinook fishery	0	0	8	8	0	0	20	2
Whitefish fishery	0	0	0	0	0	0	15	1
Smallmouth bass, walleye, and sturgeon fisheries	0	0	0	0	0	0	0	0
Total (worst case scenario)	870	44	9	8	12,000	625	70	7

¹ h = hatchery-origin and n = natural-origin

² estimates are for all *O. mykiss*, which likely includes a significant portion of resident, non-anadromous rainbow trout.

Table 7.3. Proportional natural-origin UCR steelhead mortality take limit for recreational harvest fisheries in the Wenatchee River, Methow River, and Okanogan River basin tributary areas by run size. Catch and release mortality is assumed to be 5%.

Tributary Area	Priest Rapids Dam Count	Escapement to Tributary Area	Mortality Impact	
			Proportion	Count
Wenatchee River and Columbia River above Rock Island Dam to below Rocky Reach Dam				
	<837	<599	0%	0
Tier 1	838	600	2%	12
Tier 2	2,146	1,700	4%	68
Tier 3	3,098	2,500	6%	150
Methow River and Columbia River above Wells Dam				
	<803	<499	0%	0
Tier 1	804	500	2%	10
Tier 2	2,224	1,600	4%	68
Tier 3	3,386	2500	6%	150
Okanogan Basin upstream of the Highway 97 Bridge				
	<175	<119	0%	0
Tier 1	176	120	5%	6
Tier 2	180	120	7%	8
Tier 3	795	600	10%	60

8.0 CONCLUSIONS

8.1 APPROACH

The analysis in the preceding sections of this Opinion forms the basis for conclusions as to whether the proposed action, the ongoing operation of the FCRPS and the USBR projects identified in Table 1.1, satisfies the standards of ESA Section 7(a)(2). To do so, the Action Agencies must ensure that their proposed action is not likely to jeopardize the continued existence of any listed species or destroy or adversely modify the designated critical habitat of such species. Section 4.0 of this Opinion defines the biological requirements and the current range-wide status of each of the 12 listed salmonid species and one species proposed for listing. Section 5.0 evaluates the relevance of the environmental baseline to each species' current status. Section 6.0 details the likely effects of the proposed action on individuals of the species in the action area, on the listed populations across their range and life cycle, and on designated critical habitat. Section 7.0 considers the cumulative effects of relevant non-Federal actions reasonably certain to occur within the action area. On the basis of this information and analysis, NOAA Fisheries draws its conclusions about the effects of the FCRPS and the USBR projects on the likelihood of both the survival and recovery of the 12 listed and one proposed species of Columbia River salmonids, as well as the effects on critical habitat.

8.1.1 Jeopardy Analysis

As discussed in Section 1.2.5 of this Opinion, NOAA Fisheries must now determine whether any reductions of the species' productivity, numbers, or distribution caused by the proposed action reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the listed species or result in the destruction or adverse modification of critical habitat. Where the analysis in Section 6.0 indicates that there are not likely to be any net adverse effects to an ESU from the proposed action, NOAA Fisheries' conclusion will necessarily be that the action is not likely to jeopardize the ESU's continued existence. A reduction in the likelihood of both survival and recovery cannot occur if there is no net reduction in the productivity, numbers, or distribution of that ESU, consistent with the regulatory definition of "jeopardize the continued existence" (50 CFR § 402.02). Similarly, for the critical habitat determination, if there is no net adverse alteration of any essential features of critical habitat, there can be no adverse modification of that habitat. Although there may be no net adverse effect to an ESU or its habitat, NOAA Fisheries nevertheless reviews the factors relevant to the "appreciable reduction" and "adverse modification" determinations for that ESU to provide the full context for this analysis.

The information available to NOAA Fisheries for this determination is both quantitative and qualitative. For some species, such as SR spring/summer chinook salmon, the available information includes substantial quantitative data based on empirical observations. For other species, such as SR sockeye salmon and several lower river ESUs, the available information is largely qualitative, based on the best professional judgment of knowledgeable scientists. Despite an increasing trend toward a more quantitative understanding of the critical life signs for these fish, critical uncertainties limit NOAA Fisheries' ability to project future conditions and effects.

As a result, no absolute numerical indices are available for any of these stocks on which NOAA Fisheries can base determinations about jeopardy or the adverse modification of critical habitat (the Section 7(a)(2) standards). Ultimately, for all 13 ESUs, NOAA Fisheries' conclusions are qualitative judgments based on the best quantitative and qualitative information available for each species.

As described in Section 1.2.5 and Section 6.0, NOAA Fisheries considers effects of an action on an ESU by first considering effects on individual populations, then on major population groups identified by Technical Recovery Teams (TRTs), and finally on the ESU as a whole. Effects on populations and major population groups were described in Section 6.0. In judging whether a reduction in the numbers, productivity, or distribution of an ESU constitutes an appreciable reduction in the likelihood of the ESU's survival and recovery, NOAA Fisheries considers the following factors:

Number of Major Population Groups in the ESU. ESUs with only one or two major population groups are more likely than ESUs with several major population groups to be reliant on individual populations for recovery or even continued survival (e.g., in the face of major catastrophic events). The smaller the number of major population groups in an ESU, the more likely that a reduction in numbers, productivity, or distribution of one or more groups would constitute an appreciable reduction in the ESU's likelihood of survival and recovery.

Proportion of Major Population Groups with Reduced Numbers, Productivity, or Distribution. The higher the percentage of major population groups in an ESU with a reduction in numbers, productivity, or distribution, the more likely this would constitute an appreciable reduction in the ESU's likelihood of survival and recovery. Conversely, the smaller the proportion of groups with an adverse effect, the less likely there would be an appreciable reduction.

Magnitude of the Reduction for Affected Major Population Group(s). A large reduction in numbers, productivity, or distribution for the affected population group(s) would be more likely than a small reduction to constitute an appreciable reduction in the ESU's likelihood of survival and recovery. As described in Section 6.0, in determining the magnitude of the reduction, it is relevant to consider the relative timing of adverse and beneficial components of the proposed action.

Range-wide Status of the ESU. An endangered ESU would presumably have less capacity for reduction in numbers, productivity, or distribution than a threatened ESU. Similarly, an endangered or threatened ESU that has been declining significantly in recent years would have less capacity for reduction in numbers, productivity, or distribution than an ESU with an increasing population trend. Therefore, it is more likely that a reduction will be considered 'appreciable' for endangered than for threatened ESUs and for declining rather than relatively stable or increasing ESUs.

If the beneficial effects of some components of the proposed action will be delayed relative to the proposed action's adverse effects, NOAA Fisheries must consider the status and viability of the population during the lag period. There would be an appreciable reduction in the likelihood

of survival and recovery if population abundance or productivity were too low during the lag period to respond to later beneficial effects.

Status of the ESU in the Action Area (Environmental Baseline). The extent to which an ESU's biological requirements are not being fully met within the action area is relevant to that ESU's capacity to tolerate additional similar adverse effects. The extent of the action area relative to the range-wide distribution of the ESU is also relevant. The greater the proportion of the range of the ESU represented by the action area, the more significant is the status of the ESU within the range to the "appreciable reduction" determination. In summary, NOAA Fisheries would be more likely to conclude that a reduction in numbers, productivity, or distribution is an appreciable reduction in the likelihood of both survival and recovery if the status of the ESU in the action area is poor relative to its biological requirements and if the action area represents a significant proportion of the ESU's range.

Impact of Cumulative Effects on the Status of the ESU in the Action Area. NOAA Fisheries must consider the influence of non-Federal actions that are reasonably certain to occur in the action area. The key question is whether inclusion of cumulative effects modifies the characterization of the status of an ESU in the action area.

Uncertainty. Available science is unable to resolve significant uncertainty in all parts of this analysis. NOAA Fisheries must identify and acknowledge the full range of scientific uncertainty in reaching its final conclusion. Where scientific gaps remain, NOAA Fisheries is expected to provide the benefit of the doubt to the listed species (ESA Section 7 Consultation Handbook, p. 1-6). A key question is whether or not the uncertainty is greater in the analysis of the presumed positive effects of non-hydro offsets compared to presumed negative effects of hydro operations, or if the level of uncertainty is comparable. Therefore, NOAA Fisheries has taken a conservative approach to estimate the benefit of the proposed action.

8.1.2 Analysis of Adverse Modification of Critical Habitat

If NOAA Fisheries determines in Section 6.0 that the proposed action alters an essential feature of designated critical habitat, NOAA Fisheries then evaluates whether the alteration would constitute the destruction or adverse modification of designated critical habitat by appreciably diminishing the value of critical habitat for survival or recovery. In determining whether an alteration of an essential feature of critical habitat would also appreciably diminish the value of critical habitat for survival or recovery, NOAA Fisheries considers the magnitude and duration of the alteration, the condition of critical habitat in the action area under the environmental baseline and cumulative effects, the likely purpose of the affected essential feature for survival and recovery, the status of the ESU across its range and within the action area, and the amount of uncertainty presented by the available scientific data and analyses.

8.1.3 Summary of Conclusions for All ESUs

Conclusions for the 13 ESUs are summarized in Table 8.1. Details regarding those conclusions are discussed in Sections 8.2 through 8.14.

Table 8.1. Summary of conclusions.

ESU	ESU Net Effect - Change in Numbers, Reproduction, or Distribution? ¹	ESU Jeopardy Determination - Appreciable Reduction in Likelihood of Survival and Recovery?	ESU Adverse Modification Determination
SR Spring/Summer Chinook	Reduce (short-term)	Not likely to jeopardize	Not likely to adversely modify
SR Fall Chinook	Reduce (short-term)	Not likely to jeopardize	Not likely to adversely modify
UCR Spring Chinook	Reduce (short-term)	Not likely to jeopardize	N/A
LCR Chinook	Reduce (short-term)	Not likely to jeopardize	N/A
UWR Chinook	No Change	Not likely to jeopardize	N/A
SR Steelhead	Reduce (short-term)	Not likely to jeopardize	N/A
UCR Steelhead	Reduce (short-term)	Not likely to jeopardize	N/A
MCR Steelhead	Reduce (short-term)	Not likely to jeopardize	N/A
UWR Steelhead	No Change	Not likely to jeopardize	N/A
LCR Steelhead	Reduce (short-term)	Not likely to jeopardize	N/A
CR Chum	Reduce (short-term) to NC ²	Not likely to jeopardize	N/A
LCR Coho	No Change	Not likely to jeopardize	N/A
SR Sockeye	Reduce (short-term)	Not likely to jeopardize	Not likely to adversely modify

8.1.4 Supplemental Consultations for USBR Projects in Occupied Habitat

As part of the UPA and consistent with the action proposed for the 2000 Biological Opinion and its resulting RPA, these conclusions also apply to the effects of 19 USBR projects that all have

¹ “Short-term” refers to a reduction that persists no longer than 2010.

² As described in Section 6.13, it is unknown whether or not there is an extant population of SR chum salmon above Bonneville dam. If such a population exists, there would be a short-term reduction. If a population does not exist above Bonneville Dam, there would be no change between the reference and proposed action.

effects on the mainstem Columbia River. For many of these projects, the only effects on the affected ESUs occur in the mainstem (e.g. the Montana, Columbia Basin, The Dalles, and Chief Joseph projects). Other USBR irrigation projects located in watersheds inhabited by listed salmonids could affect spawning and egg-to-smolt life stages: the Okanogan, Yakima, Umatilla, Deschutes, Wapinitia, Tualatin, and Lewiston Orchards projects. The 2000 Biological Opinion, RPA Action 30, called for supplemental consultations during which USBR would provide further detail about these projects and their tributary effects in supplemental biological assessments. NOAA Fisheries would then consider those effects, as well as any further information about the mainstem effects of those projects, and provide supplemental biological opinions for each such project. Since 2000, NOAA Fisheries and USBR have completed a supplemental consultation for the Umatilla Irrigation Project. The USBR now proposes in its UPA, Appendix B, to continue with supplemental consultations for the remainder of these projects. Most of these supplemental consultations are now under way, as discussed in the UPA, Appendix B. The conclusions in this Opinion for these USBR projects, therefore, will be further refined by these supplemental consultations.

8.2 SR SPRING/SUMMER CHINOOK SALMON

After reviewing the current status of SR spring/summer chinook salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species or adversely modify or destroy designated critical habitat.

Magnitude of Reduction(s): The net combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would reduce numbers and productivity by a Low amount for the five major population groups in this ESU (Section 6.0) initially. Beneficial actions that are phased in during the term of the proposed action would be expected to reduce the negative effects to "no change" by 2010-2014.

Number of Major Population Groups: The presence of five major population groups in this ESU (Section 4.0) makes it is less likely that any single group is significant for this ESU's viability, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The net combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce numbers and productivity by a Low amount for all five major population groups in this ESU (Section 6.0). Beneficial actions such as configuration changes and non-hydro actions that would be phased in during the term of the proposed action would be expected to reduce the negative effects to "no change" by 2010-2014.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, most populations experienced long-term declines, but short-term trends were positive for many populations. The short-term productivity trends for the majority of the natural production areas in the ESU are at or above replacement. Dam counts and preliminary spawner surveys also indicate higher than average abundance in 2002 and 2003. The recent 10-year average is approximately twice the previous 10-year average for combined

hatchery and wild adults passing Lower Granite Dam. The BRT concluded that the natural component of the ESU had moderately high risk in the abundance and productivity VSP categories and comparatively low risk for spatial structure and diversity. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that SR spring/summer chinook salmon artificial production programs provide benefits to ESU abundance, spatial structure, and diversity but have neutral or uncertain effects on ESU productivity. Collectively, hatchery programs do not substantially reduce the long-term extinction risk of the ESU. However, the existing safety net program is effective at reducing the short-term risk of extinction (see Section 6.3.2.3).

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, and the existing structures and facilities result in high levels of mortality for juvenile fish migrating toward the ocean. Beginning in the 1980s and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams and USBR projects, along with mainstem harvest rates, are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: Direct adult and juvenile survival rates through FCRPS projects are known with relative certainty for SR spring/summer chinook salmon. These estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the dams and non-discretionary hydro operations). The precision with which NOAA Fisheries

can distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult both to describe the limits of some areas of the Action Agencies' discretion and to define and model a reference operation that would maximize the survival of listed fish. The average post-Bonneville differential survival of transported juveniles (D) relative to non-transported juveniles is fairly well known for this ESU, based on the large sample sizes attained in the empirical studies conducted in recent years. NOAA Fisheries' estimate of the magnitude of the latent mortality of in-river migrants, including any differences in latent mortality between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, NOAA Fisheries' estimate of the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. A Very Low improvement was assumed in the net effects analysis from tributary habitat restoration, reflecting the uncertainty associated with predicting the effects of the proposed activities on this ESU.

Summary: There is a mix of high and low risk considerations for the SR spring/summer chinook ESU, both range-wide and in the action area. High mortality in the action area, caused largely by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation), indicates relatively high risk. However, recent adult returns and short-term productivity trends that are at or above replacement indicate reduced range-wide risk, at least in the short term, and thus some tolerance for additional short-term risk. While the net reduction would be Low early in the term of the proposed action, beneficial actions would reduce the effect to "no change" and perhaps to a net improvement by 2010 and beyond. Strong returns of adults during the past four years suggest that a short-term lag in achieving beneficial effects would not have serious consequences. For these reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

Critical Habitat: As described in Section 6.3.3.2, using the Environmental Baseline Approach, the proposed action negatively impacts the essential habitat feature of safe passage in the juvenile migration corridor between 2005-2009 but results in a net improvement in safe passage conditions between 2010-2014. The magnitude of the reduction in safe passage (relative to the reference operation) during the first five years is significant, even considering the immediate improvement in safe passage that would result from expansion of the northern pikeminnow removal program. The magnitude of expected improvements in mainstem habitat function during the second five years would also be significant. The purpose of safe passage, relative to "survival or recovery" of listed species, is survival through the migratory corridor at a rate sufficient to

support increasing populations up to at least a recovery level. The in-river survival rate necessary for recovery is currently unknown.

Safe passage and other essential features of critical habitat in the juvenile migration corridor habitat under the environmental baseline are poor. The juvenile migration corridor has been greatly modified by the existence of the FCRPS dams, reservoirs, and non-discretionary hydro operations, as described in Section 5.0. A significant proportion of the migrating juveniles is transported around most FCRPS dams in order to avoid the baseline passage conditions. No actions that are properly considered cumulative effects are expected to change the status of critical habitat in the juvenile migration corridor. The range-wide status of the ESU is described above. It is characterized by a mixture of a long-term decline in abundance and productivity, short-term improvements in abundance and productivity over the past three to four years, and current abundance levels that are below interim recovery targets.

NOAA Fisheries expects that the proposed action would have positive effects on critical habitat in the upper Salmon, Little Salmon, and Lemhi subbasins. Cumulative effects would be a mixture of positive and negative changes in essential features of critical habitat in these tributary spawning and juvenile rearing areas.

After considering all of these factors, NOAA Fisheries concludes that the proposed action would not be likely to adversely modify or destroy designated critical habitat for this ESU. This conclusion is based primarily on the determination that, by the sixth year of this proposed action, the condition of critical habitat in the juvenile migration corridor would be improved beyond both the current condition and the condition associated with the reference operation. Some of the most significant improvements would be structural modifications to dams that would be expected to remain in place long after 2014. Therefore, the proposed action is not likely to appreciably reduce the value of critical habitat for survival or recovery on a time scale relevant to the recovery of the ESU, especially in light of the recent (short-term) improvement in the status of the ESU.

Under the Listing Condition Approach applied in Section 6.0, there is no adverse modification or destruction of critical habitat possible because there is not likely to be any alteration of essential features of critical habitat below their condition at the time this ESU was listed.

8.3 SR FALL CHINOOK SALMON

After reviewing the current status of SR fall chinook salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would have the net effect of initially reducing numbers and productivity by a Medium amount for the single extant population in this ESU (Section 6.0). Beneficial actions that would be phased in during the term of the proposed action would be

expected to reduce the negative effects to “no change” or possibly an improvement by 2010-2014.

Number of Major Population Groups: There is only one population and therefore one major population group in this ESU (Section 4.0), which makes it significant for this ESU’s viability.

Proportion of Major Population Groups Reduced: The combination of discretionary hydro operations, hydro configuration changes, and off-site actions would initially reduce the numbers, productivity, and distribution of the single extant population in this ESU. Beneficial actions that would be phased in during the term of the proposed action would be expected to reduce the negative effects to “no change” or possibly an improvement by 2010-2014.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, the natural component of this ESU had experienced long-term declines, but the short-term trend was positive. The June 14, 2004, Status Review indicated that, depending upon the assumption made about the likelihood of the progeny of hatchery fish returning as productive adults, long- and short-term trends in productivity are at or above replacement. Dam counts and preliminary spawner surveys also indicate higher than average abundance in 2002 and 2003. In fact, the four years 2001-2003 have resulted in the highest returns of naturally produced spawners to areas above Lower Granite Dam since the early 1960s, shortly after access to spawning areas above Hells Canyon was lost (Section 4.0). The BRT was concerned that overall abundance of natural spawners has been low in spite of recent improvements and concluded that the natural component of the ESU had moderately high risk for all VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that SR fall chinook salmon artificial production programs provide slight benefits to ESU abundance, spatial structure, and diversity but have neutral or uncertain effects on ESU productivity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor, resulting in high levels of mortality for juvenile SR fall chinook migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams and USBR projects, along with mainstem harvest rates, are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private

actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: Direct adult survival rates through the FCRPS are known with relative certainty. As described in Sections 5.0 and 6.0, the survival of juveniles through the FCRPS, especially the effects of FCRPS passage or transport on survival below Bonneville Dam, are not well known. There is also uncertainty regarding the life history strategy followed by SR fall chinook (Section 6.4.1). Empirical information regarding survival rates of SR fall chinook is available only for the subyearling migration strategy, but recent information suggests that a significant portion of returning adults emigrated as yearlings. An analysis that evaluates the sensitivity of conclusions to different proportions of yearlings in the ESU is included in Section 6.0. In addition, there is uncertainty regarding the survival of juveniles through the FCRPS. For instance, Williams *et al.* (2004) state that “no empirical evidence exists to suggest that transportation either harms or helps fall chinook salmon.” Nevertheless, NOAA Fisheries continues to believe that, in light of the increasing trend in returning adults, maximizing transportation of fall chinook continues to be the best method of insuring their survival and recovery until more definitive information can be gathered that indicates there is a better alternate operation. Accordingly, the reference operation (as described in Appendix D) would call upon the Action Agencies to continue the current efforts to maximize fall chinook collection and transportation.

The survival estimates described herein represent a combination of the proposed hydro operation and the environmental baseline (i.e., existence of the hydro system and non-discretionary hydro operations). NOAA Fisheries’ ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult both to describe the limits of some areas of the Action Agencies’ discretion and to define and model a reference operation that would maximize the survival of listed fish.

Further uncertainty is due to the fact that there are few estimates of the effects of configuration improvements on subyearling chinook, so that NOAA Fisheries must infer the benefits of RSWs and other passage improvements from data for other ESUs. There are also no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. An analysis that evaluates the influence of extrapolating Snake River reach survival rates to the lower Columbia is included in Section 6.0. While specific effects of hydro operations on estuary and

plume habitat are uncertain, the relatively large difference in summer flows and lack of a difference in water quality between the reference and proposed operations are fairly certain.

Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. There was uncertainty associated with the magnitude of effects of the estuary improvement actions on this ESU. The determination that artificial propagation measures will increase the viability of the ESU by a Low amount is also uncertain.

Summary: In general, there is high risk for the SR fall chinook ESU, both range-wide and in the action area. Significant risk factors include the presence of only one extant population in the ESU and the high mortality rate in the action area, caused largely by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation). One factor that indicates at least a short-term reduction in risk is the record adult return numbers in the last four years. The June 14, 2004, Status Review indicated that, depending upon the assumption made about the likelihood of the progeny of hatchery fish returning as productive adults, long- and short-term trends in productivity are at or above replacement. These recent results are encouraging and signal at least a short-term improvement in the range-wide trend. The main consideration in determining if the proposed action constitutes an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU.

No difference in adult survival would be expected as a result of implementing the proposed action.

For juvenile SR fall chinook, the activities that differentiate the proposed and reference operations would primarily affect the relatively small proportion of fish that migrates through lower Columbia dams and reservoirs. Transported fish, and the juveniles that die or hold over in the river en route to collector sites in the Snake River, are expected to experience nearly identical survival rates under the proposed and reference operations. Survival of the small fraction of the population that migrates through the lower Columbia River is expected to be lower under the proposed action but, when placed in the context of a reasonable range of effects on transported fish, it is likely that the population as a whole is minimally affected by the proposed action. Results indicate that, initially, both survival of in-river migrants and that of the population as a whole would be expected to be lower than survival under the reference operation, with that difference constituting a Medium impact. That impact would be approximately a 2-3% reduction in survival for the entire population, as described in Section 6.4, which would place it at the lowest end of the Medium category. Non-hydro actions do not appear sufficient to offset this effect in the first few years of the proposed action. However, by 2010, various hydro improvements and non-hydro offsets would be expected to result in improved hydro survival, and the reduction for the entire population would be 2% or less. Non-hydro actions such as

estuary habitat improvements, predator reductions, and hatchery programs should offset the hydro impacts and result in no net change, or possibly an improvement in survival, by 2010.

There is uncertainty both in NOAA Fisheries' estimates of the negative effects of the proposed action and of the likely beneficial effects. Key uncertainties relate to various factors affecting juvenile survival rates, the degree to which compensatory responses might negate some benefits of predator removal, and the efficacy of habitat restoration projects. Sensitivity analyses generally indicate that the conclusions stated above are robust to a range of reasonable assumptions.

The question of whether the difference in juvenile survival during the first few years of implementing the proposed action would represent an appreciable reduction in the likelihood of survival and recovery is largely influenced by the recent trend in adult abundance and productivity. It is encouraging that the June 14, 2004 Status Review indicated that, depending upon the assumption made about the likelihood of the progeny of hatchery fish returning as productive adults, long- and short-term trends in productivity are at or above replacement. The progeny of the strong returns of adults during the past four years will be returning as adults over the next several years. While NOAA Fisheries does not yet know the survival rates that these upcoming broods are experiencing, the high numbers of spawners during the last few years suggest that initial production of eggs and early life stages likely was above average. Even average survival rates, coupled with above-average initial production, would result in above-average adult returns over the next few brood cycles. Although NOAA Fisheries' notice of proposed listings concluded that current hatchery operations do not substantially reduce extinction risk, ongoing hatchery programs do help to reduce concerns of extinction in the immediate future. In summary, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

Critical Habitat: As described in Section 6.4.3.2, using the Environmental Baseline Approach, the "safe passage" essential feature in the juvenile migration corridor during this period would be negatively altered, compared to the reference operation, because spill rates and flows would be lower in the proposed operation than in the reference operation. However, for the reasons stated below, this impact does not appreciably diminish the value of the habitat for this ESU as it relates to either its survival, because so few fish are actually affected by it, or its recovery, because the same rate of safe passage possible under the environmental baseline remains available into the future.

As described above under "Summary," only a small portion of the fish within this ESU actually complete their juvenile migration entirely in-river during the summer migration season because of the juvenile transportation program. In a typical year, about half of the juvenile migrants are transported. The remaining juvenile in-river migrants may voluntarily rear in reservoirs (holding over to migrate in the early spring as larger fish), die as result of dam or reservoir passage, or survive to below Bonneville Dam. In comparing the proposed action to the reference operation, almost all of the difference in "safe passage" conditions results from conditions primarily due to reductions in spillway passage that occur between Lower Monumental Dam and the unimpounded river below Bonneville Dam, and the proportion of the population exposed to those conditions is very small.

Safe passage and other essential features of critical habitat in the juvenile migration corridor habitat are poor under the environmental baseline. The juvenile migration corridor has been greatly modified by the existence of the FCRPS dams, reservoirs, and non-discretionary hydro operations, as described in Section 5.0. The effect of the proposed action on those juvenile fall chinook that choose to migrate as sub-yearlings, as compared to the reference operation, is a further degradation of the “safe passage” characteristic of the habitat in the 2005-2009 period. In the 2010-2014 time period, the passage improvements in the proposed action help offset that degradation. However, the model results estimating in-river survival still show about a 10% relative (2% absolute) difference in in-river survival between the reference operation and the proposed action in the 2010-2014 time period if all fish are assumed to migrate as sub-yearlings and if an extrapolation of empirical reach survival estimates from the Snake to lower Columbia River is appropriate. As described above and in Section 6.4, sensitivity analyses to investigate the effects of uncertainty in these assumptions indicate that the impact could be lower.

The question then becomes whether a small diminishment in the “safe passage” characteristic of the in-river critical habitat for SR fall chinook constitutes an appreciable reduction in the value of critical habitat for either survival or recovery of the ESU. In this case, because the in-river survival change indicative of safe passage only affects a small proportion of the total juvenile migrants, given that the remaining juvenile migrants either residualize, die during dam and reservoir passage, or are transported, NOAA Fisheries concludes that the effect on the critical habitat, while negative, does not appreciably reduce the value of that habitat as it relates to the survival of this ESU.

When considering whether the alteration of safe passage by the proposed action appreciably diminishes the value of critical habitat for recovery, it is relevant to consider the future potential for critical habitat to meet the recovery needs of this ESU. Does the proposed action reduce the existing ability of the habitat under the environmental baseline to provide safe passage for this ESU? In this case, the reduction in safe passage is due, in large part, to the operation that does not make maximum use of spillways, the safest route of in-river passage. The operation, however, does not reduce the future availability of spillways for safer passage. Since this capacity of existing critical habitat to safely pass fish is not reduced, the proposed action does not appreciably diminish the value of the critical habitat for recovery.

Another negative alteration of critical habitat that affects all the SR fall chinook juveniles that migrate in summer is the effect on the availability of shallow-water habitat in the Columbia River and its estuary below Bonneville Dam resulting from up-river storage dams. In a typical year, the modeling shows that during July and August, flows under the proposed action are reduced about 30,000 cfs. This causes a slight reduction in shallow-water juvenile rearing habitat in the lower river and estuary. The best available scientific information indicates that this reduction is likely to be less than 50-700 acres. This effect is expected to be mitigated by completion of estuarine habitat improvement actions during the 2010-2014 period³. The magnitude of the loss of shallow-water habitat in 2005-2010 would be small and would be a relatively minor, short-term alteration that would not appreciably diminish the value of this habitat for the survival or recovery of SR fall chinook.

³ See Footnote 30 in Section 6.4.

After considering all of these factors, NOAA Fisheries concludes that the proposed action would not be likely to destroy or adversely modify critical habitat for this ESU by appreciably diminishing the value of critical habitat for survival or recovery.

Under the Listing Condition Approach applied in Section 6.0, there is no adverse modification or destruction of critical habitat possible because there is not likely to be any alteration of essential features of critical habitat below their condition at the time this ESU was listed.

8.4 UCR SPRING CHINOOK SALMON

After reviewing the current status of UCR spring chinook salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce numbers, productivity, and distribution by a Medium amount for all populations and for the single major population group (Section 6.0). Beneficial actions that would be phased in during the term of the proposed action would result in an improvement by 2010.

Number of Major Population Groups: There is only one major population group, which is composed of three extant populations, in this ESU (Section 4.0), so its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce numbers, productivity, and distribution of the single major population group in this ESU (Section 6.0). Beneficial actions that would be phased in during the term of the proposed action would result in an improvement by 2010.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is an endangered species. The BRT reported that, through 2001, most populations experienced both long-term and short-term declines, but abundance was high in 2001 for all populations. Dam counts and preliminary spawner surveys also indicate generally higher than average abundance of wild stocks in 2002 and 2003. Mean aggregate (wild and hatchery) returns in 2001-2003 are over 1000% higher than mean aggregate returns during 1996-2000. Aggregate returns also indicate a positive trend in abundance in recent years. The BRT expressed strong concern regarding risk to the natural component of the ESU with respect to the abundance and productivity VSP categories and comparatively less concern over spatial structure and diversity. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that UCR spring chinook salmon artificial production programs provide benefits to ESU abundance, have no effect on spatial structure, provide benefits relative to preservation of diversity in some instances, and have uncertain effects on ESU productivity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor used by UCR spring chinook, resulting in high levels of mortality for juvenile fish migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams and USBR projects, coupled with baseline effects of FERC projects in the mid-Columbia River and mainstem harvest rates, are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: Direct juvenile survival rates through FCRPS projects are uncertain for UCR spring chinook but are known with relative certainty for SR spring/summer chinook salmon, which are very similar in terms of migration timing and biological requirements. These estimates represent the effects of a combination of discretionary annual operations and the environmental baseline (the existence of FCRPS and USBR projects and non-discretionary hydro operations). NOAA Fisheries’ ability to distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult to precisely describe the limits of some areas of the Action Agencies’ discretion, and because it is difficult to define and model a reference operation that maximizes the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain.

Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. No improvement was assumed in the net effects analysis from estuarine habitat restoration, reflecting the uncertainty associated with effects of the proposed estuarine habitat actions on this ESU. Because estimates of benefits for UCR spring chinook tributary habitat projects are uncertain, NOAA Fisheries considered these benefits to be at the Low end of the Medium range in the net effects analysis.

Summary: Most factors indicate high risk for the UCR spring chinook ESU, both range-wide and in the action area. Because there is only a single major population group and because its poor status both range-wide and in the action-area is caused largely by the effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation), tolerance for additional risk to this ESU is “low.” One factor indicating a degree of tolerance for additional short-term risk is the increased adult returns in recent years. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU.

Whereas the net reduction would be Medium early in the term of the proposed action, beneficial actions would reduce the effect to “no change” and perhaps to a net improvement by 2010. Strong returns of adults in recent years suggest that this lag in achieving beneficial effects would not have serious consequences. For these reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.5 UWR CHINOOK SALMON

After reviewing the current status of UWR chinook salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0) and could result in an improvement.

Number of Major Population Groups: There is only one major population group, which is composed of seven extant populations, in this ESU (Section 4.0), so its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that it is very difficult to determine trends in abundance and productivity for the natural component of the ESU, because there are no direct estimates of natural-origin spawner abundance. The BRT concluded that the natural component of the ESU had moderately high risk for all four VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that UWR chinook salmon artificial production programs provide slight benefits to ESU abundance and spatial structure but have neutral or uncertain effects on ESU productivity and diversity. Collectively, hatchery programs do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. However, as described in Section 5.0, habitat-related biological requirements of juvenile UWR chinook salmon are not being fully met in the action area. The significant baseline effects of FCRPS and USBR projects and mainstem harvest rates are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are "reasonably certain to occur" in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. While specific effects of hydro operations on estuary and plume habitat are uncertain, the

relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the avian predation program are uncertain for this ESU. NOAA Fisheries assumed no improvement for yearling migrant UWR chinook salmon from estuarine habitat restoration in the net effects analysis, reflecting the uncertainty associated with predicting the effects of the proposed action on this ESU. There was also some uncertainty associated with the estimate of a Medium improvement from estuarine habitat actions for the subyearling component of the ESU.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.6 LCR CHINOOK SALMON

After reviewing the current status of LCR chinook salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets initially reduce numbers, productivity, and distribution by a "low to medium" amount for two of the six major population groups, but by the end of the proposed action period, there is "no change" or possibly an improvement for all six major population groups.

Number of Major Population Groups: The presence of six extant major population groups in this ESU (Section 4.0) means that it is less likely that the viability of any single group is significant for this ESU's survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets reduce numbers, productivity, and distribution of two of the six extant major population groups initially (Section 6.0), but by the end of the proposed action period, there is "no change" or possibly an improvement for all major population groups.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that most populations have exhibited pronounced increases in abundance and productivity in recent years, although the abundance of naturally produced spawners is uncertain. Despite recent improvements, long-term trends are below replacement for the majority of populations in the ESU. The BRT concluded that the natural component of the ESU had moderately high risk for all VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that LCR chinook salmon artificial production programs provide slight benefits to ESU abundance, spatial structure, and diversity but have neutral or uncertain effects on ESU productivity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU, described in Section 4.0. Adult passage at Bonneville Dam as experienced by individuals from two MPGs is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating toward the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville Dam, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams, USBR projects and mainstem harvest rates are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: Direct juvenile survival rates through the Bonneville project for the two affected major population groups are uncertain for LCR chinook, because direct estimates are not available. Except for juveniles from the Hood, Sandy, and Kalama populations, LCR chinook emigrate as subyearlings, so the most similar ESU for which estimates are available is the SR fall chinook ESU. As described in Section 8.3, the survival estimates for SR fall chinook are also uncertain, and because SR fall chinook pass through Bonneville pool and dam at a much larger size than LCR chinook, their survival rate could be higher. These SR fall chinook estimates represent the effects of a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The precision with which NOAA Fisheries’ can distinguish between juvenile survival associated with discretionary annual hydro operations and environmental baseline conditions is uncertain both because it is difficult to describe the limits of some areas of the Action Agencies’ discretion and because it is difficult to define and model a reference operation

that would maximize the survival of listed fish. The magnitude of latent mortality of the component of the ESU that migrates through Bonneville pool and dam, including any differences in this measure between the reference and proposed operation, is highly uncertain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring and fall flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program for two major population groups that originate above Bonneville Dam are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. Uncertainty was associated with estimation of the estuarine habitat restoration effects on this ESU.

Summary: There is a mix of high and low risk considerations for the LCR chinook ESU, both range-wide and in the action area. Because biological requirements are not being fully met in the action area, caused largely by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation), tolerance for additional risk to this ESU is low. However, recent adult returns indicate reduced range-wide risk, at least in the short term, and some tolerance for additional short-term risk. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action would pose an additional risk to the ESU. No additional risk would be likely by 2010 for any major population groups. However, two of the six major population groups would be expected to experience an initial “low to medium” reduction as a result of lower spill and passage survival at Bonneville Dam than in the reference operation. Because of the pronounced increases in abundance and productivity of this ESU in recent years, it is unlikely that the delay in implementing estuary restoration projects would significantly increase the risk of extinction of the ESU as a whole during the lag period. Because of the short duration of net adverse impacts for only two of the six MPGs, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of this ESU.

8.7 SR STEELHEAD

After reviewing the current status of SR steelhead, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The net combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce numbers and productivity by a Low amount for the six major population groups in this ESU (Section 6.0). Beneficial actions

that would be phased in during the term of the proposed action would be expected to reduce the negative effects to “no change” by 2010-2014.

Number of Major Population Groups: The presence of six major population groups in this ESU (Section 4.0) means that it is less likely that the viability of any single group is significant for this ESU’s survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The net combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would be to initially reduce numbers and productivity by a Low amount for the six major population groups in this ESU (Section 6.0). Beneficial actions that would be phased in during the term of the proposed action would be expected to reduce the negative effects to “no change” by 2010-2014.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, available census information indicated mixed trends in abundance and productivity. The BRT concluded that the natural component of the ESU had moderately high risk for the abundance, diversity, and productivity VSP categories and comparatively lower risk for spatial structure. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that many populations within the LCR chinook ESU have exhibited pronounced increases in abundance and productivity in recent years. SR steelhead artificial production programs provide slight benefits to ESU abundance and spatial structure but have neutral or uncertain effects on ESU productivity and diversity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams, USBR projects, and mainstem harvest rates are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of

further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline..

Uncertainty: Direct juvenile survival rates through FCRPS projects are known with relative certainty for SR steelhead. These estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The precision with which NOAA Fisheries can distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult to describe the limits of some areas of the Action Agencies' discretion and also difficult to define and model a reference operation that would maximize the survival of listed fish. The average post-Bonneville differential survival of transported juveniles, relative to non-transported juveniles (D), is fairly well-known for this ESU, based on large sample sizes obtained in empirical studies conducted in recent years. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed hydro action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. Because estimates of benefits for SR steelhead tributary habitat projects are uncertain, NOAA Fisheries considered these benefits Very Low in the net effects analysis.

Summary: There is a mix of high and low risk considerations for the SR steelhead ESU, both range-wide and in the action area. High mortality in the action area, caused largely by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation), indicates relatively high risk. However, recent adult returns indicate reduced range-wide risk, at least in the short term, and some tolerance for additional short-term risk. Whereas the net reduction would be Low early in the term of the proposed action, beneficial actions would reduce the effect to "no change" and perhaps to a net improvement by 2010 and beyond. Strong returns of adults during recent years suggest that a short-term lag in achieving beneficial effects would not have serious consequences. For these

reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.8 UCR STEELHEAD

After reviewing the current status of UCR steelhead, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would reduce the numbers, productivity, and distribution of the single major population group in this ESU by a Medium amount initially (Section 6.0). Beneficial actions that would be phased in during the term of the proposed action would reduce the negative effects to "no change" and possibly an improvement by 2010.

Number of Major Population Groups: There is only one major population group, composed of four extant populations, in this ESU (Section 4.0), so its viability is significant for the ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce numbers, productivity, and distribution of the single major population group in this ESU (Section 6.0). Beneficial actions that are phased in during the term of the proposed action reduce the negative effects to "no change" by 2010, so no populations are affected at that point.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is an endangered species, although in its June 14, 2004 status review and proposed listing determination, NOAA Fisheries has proposed redesignation to threatened status. The BRT reported that, through 2000, most populations experienced long-term declines, but abundances were higher in 2001 for all populations. Dam counts and preliminary spawner surveys also indicate higher than average abundance levels in 2002 and 2003. In the 2004 status review, NOAA Fisheries reported that the last 2–3 years (through 2001) had seen an encouraging increase in the number of naturally produced fish in the UCR steelhead ESU. A preliminary analysis indicates that the slope of the natural-origin population trend increased 9.2% (from 0.97 to 1.06,) when the data for 2001–2003 were added to the 1990–2000 series, reversing the decline and indicating, at least in the short term, that the run size has been increasing. The BRT found high risk to the natural-origin component of the ESU with respect to the productivity VSP category but comparatively lower risk for the other categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that UCR steelhead artificial production programs provide benefits to ESU abundance and spatial structure but have neutral or uncertain effects on ESU productivity and diversity. Overall, hatchery programs collectively mitigate the immediacy of extinction risk of the ESU in-total in the short term, but the contribution of these programs in the foreseeable future is uncertain.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU (described in Section 4.0). Adult passage at existing dams is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, habitat-related biological requirements of juveniles are not fully met within the action area. The significant baseline effects of FCRPS dams and USBR projects, coupled with baseline effects of FERC projects in the mid-Columbia River and mainstem harvest rates, are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: Direct juvenile survival rates through FCRPS projects are uncertain for UCR steelhead but are known with relative certainty for SR steelhead, which are very similar in terms of migration timing and biological requirements. These estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of FCRPS and USBR projects and non-discretionary hydro operations). The precision with which NOAA Fisheries can distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult both to describe the limits of some areas of the Action Agencies’ discretion and to define and model a reference operation that would maximize the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in latent mortality between the reference and proposed operations, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. Because estimates of benefits for UCR steelhead tributary habitat projects are uncertain, NOAA Fisheries considered these benefits to be at the Low end of the Medium range in the net effects analysis.

Summary: Although its status has been improving recently, most factors indicate high risk for the UCR steelhead, both range-wide and in the action area. Because of the single major population group and poor action-area status, caused largely by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation), tolerance for additional risk to this ESU is low. However, recent adult returns indicate reduced range-wide risk, at least in the short term, and some tolerance for additional short-term risk. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU. While, initially, the net reduction would be Medium over the term of the proposed action, beneficial actions would reduce the effect to “no change” and perhaps to a net improvement by 2010. Strong returns of adults during recent years suggest that the lag in achieving beneficial effects would not have serious consequences. For these reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.9 MCR STEELHEAD

After reviewing the current status of MCR steelhead, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce numbers, productivity, and distribution of all five extant major population groups by a Medium amount (Section 6.0), but by the end of the proposed action period, there would be either no change or an improvement for all major population groups.

Number of Major Population Groups: The presence of five major population groups in this ESU (Section 4.0) means that it is less likely that the viability of any single group is significant for this ESU’s survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce numbers, productivity, and distribution of all five extant major population groups (Section 6.0), but by the end of the proposed action period, there would be “no change” or possibly an improvement for all major population groups.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, most populations experienced long-term declines and positive short-term trends. In its Status Review, NOAA Fisheries noted that the abundance of natural populations in the MCR steelhead ESU increased substantially in 2001 over the previous 5 years. The Deschutes and Upper John Day rivers had recent 5-year mean abundance levels in excess of their respective interim recovery target abundance levels (NMFS 2002b). Preliminary results for 2002 indicate that the slope of the population trend for natural-origin fish increased 6.2% (from 0.99 to 1.05) when the data for 2001-2002 were added to the 1990-2000 series, indicating that, at least in the short run, the natural-origin population has been increasing. The BRT concluded that the natural component of the ESU had moderate risk for all VSP categories, with the greatest relative risk attributed to the ESU abundance category. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that MCR steelhead artificial production programs provide slight benefits to ESU abundance, a negligible contribution to spatial structure, and neutral or uncertain effects on ESU productivity and diversity. Overall, hatchery programs collectively do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at existing dams is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating toward the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams, USBR projects, and mainstem harvest rates are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has

conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline..

Uncertainty: Direct juvenile survival rates through FCRPS projects are uncertain for MCR steelhead but are known with relative certainty for SR steelhead, which are very similar in terms of timing and biological requirements. These SR steelhead survival estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The precision with which NOAA Fisheries can distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult both to describe the limits of some areas of the Action Agencies' discretion and to define and model a reference operation that would maximize the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in latent mortality between the reference and proposed operation, is highly uncertain. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. Because estimates of benefits from improvements from the John Day habitat projects are uncertain, NOAA Fisheries counted these benefits as Very Low in the net effects analysis. Hatchery effects were also uncertain and therefore considered to have Very Low benefits.

Summary: There is a mix of high and low risk considerations for the MCR steelhead ESU, both range-wide and in the action area. Because of the poor status in the action area, caused largely by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation), tolerance for additional risk to this ESU is low. However, recent adult returns indicate reduced range-wide risk, at least in the short term, and some tolerance for additional short-term risk. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action would pose an additional risk to the ESU. No additional risk is likely by 2010 for any major population groups. However, all five major population groups would be expected

to experience a Medium reduction initially. Strong returns of adults during recent years suggest that the lag in achieving beneficial effects would not have serious consequences. For these reasons, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.10 UWR STEELHEAD

After reviewing the current status of UWR steelhead, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0).

Number of Major Population Groups: There is only one major population group, composed of seven extant populations, in this ESU (Section 4.0), which means that its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets is not likely to reduce numbers, productivity, diversity, or the distribution of the single major population group (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that the ESU experienced significant increases in adult returns in recent years, but all populations in the ESU have experienced long-term declines. The BRT concluded that the natural component of the ESU had moderate risk for all VSP categories.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU (described in Section 4.0). However, as described in Section 5.0, the mainstem habitat-related biological requirements of juveniles are generally not being fully met in the action area. The significant baseline effect of FCRPS and USBR projects is a key factor influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are "reasonably certain to occur" in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the

consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of effects of off-site improvements were uncertain for this ESU.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

8.11 LCR STEELHEAD

After reviewing the current status of LCR steelhead, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce the numbers, productivity, and distribution of two of the four extant major population groups by a Medium amount (Section 6.0), but by the end of the proposed action period, there would be either "no change" or an improvement for all major population groups.

Number of Major Population Groups: The presence of four major population groups in this ESU (Section 4.0) means that it is less likely that the viability of any single group is significant for this ESU's survival and recovery, compared to ESUs with fewer major population groups.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would initially reduce the numbers, productivity, and distribution of two of the four extant major population groups by a Medium amount (Section 6.0), but by the end of the proposed action period, there would be no change or an improvement for all major population groups.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that most populations have experienced both long-term and short-term declines. In its Status Review, NOAA Fisheries noted that some anadromous populations in the LCR steelhead ESU, particularly summer-run steelhead populations, had shown encouraging increases in abundance in the 2 to 3 years ending 2001. The BRT concluded that the natural

component of the ESU had moderate risk for each of the VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that LCR steelhead artificial production programs provide slight benefits to ESU abundance, spatial structure, and diversity but have neutral or uncertain effects on ESU productivity. Collectively, hatchery programs do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU (described in Section 4.0). Adult passage at Bonneville Dam for two MPGs is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams and USBR projects are a key factor influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline..

Uncertainty: Direct juvenile survival rates through the Bonneville project are uncertain for LCR steelhead but are known with relative certainty for SR steelhead, which are very similar in terms of migration timing and biological requirements. These SR steelhead survival estimates represent the effects of a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The precision with which NOAA Fisheries can distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult both to describe the limits of some areas of the Action Agencies’ discretion and to

define and model a reference operation that would maximize the survival of listed fish. The magnitude of latent mortality of the component of the ESU that migrates through Bonneville pool and dam, including any difference in latent mortality between the reference and proposed operations, is highly uncertain. Survival of adults past the Bonneville project under proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program for the major population groups above Bonneville Dam are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. There is also uncertainty in the estimate of the effects of hatchery actions.

Summary: There is a mix of high and low risk considerations for the LCR steelhead ESU, both range-wide and in the action area. Because of the poor status in the action area, caused in part by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline (represented by the reference operation), tolerance for additional risk to this ESU is low. However, recent adult returns indicate reduced range-wide risk, at least in the short term, and some tolerance for additional short-term risk. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU would constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action would pose an additional risk to the ESU. No additional risk would be likely by 2010 for any of the major population groups. However, two of the four major population groups would be expected to experience a Medium reduction initially. Strong returns of adults during recent years suggest that the lag in achieving beneficial effects would not have serious consequences. Because of the short duration of the net reduction and its restriction to two of the four major population groups, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of this ESU.

8.12 CR CHUM SALMON

After reviewing the current status of CR chum salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): Assuming that there is an extant population above Bonneville Dam, proposed hydro operations and hydro configuration changes would reduce the abundance, productivity, and distribution of one of the three extant major population groups by a Low amount initially (Section 6.0), but by the end of the proposed action period, there would be "no change" or a possible improvement for all major population groups.

Number of Major Population Groups: The presence of only three major population groups in this ESU (Section 4.0) means that it is likely that the viability of each population group is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: Assuming there is an extant population above Bonneville Dam, proposed hydro operations and hydro configuration changes would initially reduce the abundance, productivity, and distribution of one of the three extant major population groups by a Low amount (Section 6.0), but by the end of the proposed action period, there would be no change or a possible improvement for all major population groups.

Range-wide Status of the ESU: As described in Section 4.0, this ESU is a threatened species. The BRT reported that, through 2001, long- and short-term productivity trends for ESU populations were at or below replacement. Abundance increased dramatically in 2002, but when 2003 preliminary returns are included, the 2001-2003 mean is lower than the 1996-2000 mean abundance. Even with this decline in mean abundance in 2003, preliminary analysis of the population trend indicates a stable population growth rate between 1990-2003. The BRT concluded that the natural component of the ESU had high risk for all of the VSP categories, particularly for ESU spatial structure and diversity. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that recently initiated CR chum salmon artificial production programs provide slight benefits to ESU abundance and spatial structure but have neutral or uncertain effects on ESU productivity and diversity. Collectively, hatchery programs do not substantially reduce the extinction risk of the ESU in-total.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU described in Section 4.0. Adult passage at Bonneville Dam for one MPG could be effective, but FCRPS flow management can limit the amount of and access to spawning habitat just below Bonneville Dam. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams, USBR projects, and mainstem harvest rates are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations

expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. If there is an extant population in the Gorge major population group, fish that migrate through Bonneville pool and dam as juveniles and adults could experience mortality within the range estimated for other ESUs, but this assumption is very uncertain. While specific effects of hydro operations on mainstem spawning habitat and estuary and plume rearing habitat are uncertain, the relatively small difference between the reference and proposed operations for winter spawning and incubation flows, spring migration flows, and water quality are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain for the single major population group that might still spawn above Bonneville Dam, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). There was also uncertainty in the estimate of the effects of estuarine habitat restoration and hatchery actions.

Summary: There is a mix of high and low risk considerations for the CR chum salmon ESU, both range-wide and in the action area. Because of the poor status in the action area, caused in part by effects of the FCRPS and USBR projects that are included in the hydro portion of the environmental baseline represented by the reference operation, tolerance for additional risk to this ESU is low. The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU. No additional risk would be likely by the end of the term of the proposed action for any major population groups. However, if there is an extant population above Bonneville Dam, one population in one of the three major population groups would be expected to experience a Low reduction initially. The great uncertainty regarding the existence of a population above Bonneville Dam and the stable population trend between 1990-2003 suggest that the lag in achieving beneficial effects would not have serious consequences for the ESU. Because of the short duration of the net reduction and its restriction to, at most, one of the three major population groups, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of this ESU.

8.13 SR SOCKEYE SALMON

After reviewing the current status of SR sockeye salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is

NOAA Fisheries' opinion that the proposed action is not likely to jeopardize the continued existence of this species or adversely modify or destroy designated critical habitat.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets is not likely to reduce numbers, productivity, diversity, or the distribution of the single extant population in this ESU (Section 6.0).

Number of Major Population Groups: There is only one extant population in this ESU (Section 4.0), so its viability is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets is not likely to reduce numbers, productivity, diversity, or the distribution of the single extant population in this ESU (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU is an endangered species. Only 16 naturally-produced adults have returned to Redfish Lake since the ESU was listed in 1991. The BRT found extremely high risk in all four VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that the SR sockeye salmon captive broodstock artificial production program has prevented extinction of the ESU but has not mitigated the BRT's assessment of extreme risk in all four VSP categories.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU (described in Section 4.0). Adult passage at existing dams is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, the mainstem habitat-related biological requirements of juveniles are not being fully met within the action area. The significant baseline effects of FCRPS dams, USBR projects and mainstem harvest rates are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in determining whether these harmful actions are "reasonably certain to occur" in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the

consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. Direct juvenile survival rates through FCRPS projects are assumed to be somewhat lower than the survival rates of SR spring/summer chinook and SR steelhead. This assumption is very uncertain. The SR spring/summer chinook and SR steelhead survival estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary operations). The precision with which NOAA Fisheries can distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult both to describe the limits of some areas of the Action Agencies' discretion and to define and model a reference operation that would maximize the survival of listed fish. The average post-Bonneville differential survival of transported SR sockeye juveniles, relative to non-transported juveniles (D), and the magnitude of latent mortality of in-river migrants, including any differences in latent mortality between the reference and proposed operation, is unknown. Survival of adults through the hydro system under the proposed action is relatively certain.

Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust. No improvement was assumed in the net effects analysis from estuarine habitat restoration, reflecting the uncertainty associated with effects of the proposed habitat restoration on this ESU. The determination that artificial propagation measures would increase the viability of the ESU by a Medium amount is also uncertain.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

Critical Habitat: As described in Section 6.14.3.2, using the Environmental Baseline Approach, the proposed action would negatively impact the essential feature of safe passage in critical habitat the juvenile migration corridor between 2005 and 2009, but there is a high degree of uncertainty regarding the expected effect in the period from 2010 to 2014. If the effect on SR sockeye salmon is like that on SR spring/summer chinook salmon, a net improvement in safe passage conditions would be expected between 2010 and 2014. However, if the effect is more like that described for SR steelhead, the essential feature of safe passage would continue to be altered during this period. The magnitude of the reduction in safe passage relative to the

reference operation would be significant during the first five years, even considering immediate expansion of the northern pikeminnow removal program. The magnitude of the effect during the second five years would be reduced, possibly to zero.

The purpose of safe passage, relative to “survival or recovery” of a listed species, is a survival rate through the migratory corridor that would be sufficient to support increasing populations up to at least a recovery level. The in-river survival rate necessary for recovery is currently unknown. Safe passage and other essential features of critical habitat in the juvenile migration corridor under the environmental baseline are poor. The juvenile migration corridor has been greatly modified by the existence of the FCRPS dams, reservoirs, and non-discretionary hydro operations, as described in Section 5.0. A significant proportion of the migrating juveniles is transported around most FCRPS dams in order to avoid the baseline passage conditions. No actions that are properly considered cumulative effects are expected to change the status of critical habitat in the juvenile migration corridor. The range-wide status of the ESU is described above. It is extremely poor, with continued existence of the ESU dependent upon a captive broodstock program.

After considering all of these factors, NOAA Fisheries concludes that the proposed action would not be likely to adversely modify or destroy designated critical habitat for this ESU. This conclusion is based primarily on the determination that, by the sixth year of this proposed action, the condition of critical habitat in the juvenile migration corridor either would be equivalent to the condition associated with the reference operation or reduced by a relatively small amount, which is not considered “appreciable.” Significant structural improvements would be expected to remain in place long after 2014.

Additionally, it is important to recognize that the current management strategy for the SR sockeye salmon does not rely for the survival of the species on maintenance of fully optimal conditions in the designated juvenile migration corridor critical habitat. Currently, almost all of the SR sockeye found within the hydro system are the result of a hatchery program funded entirely by the Action Agencies. The hatchery program is operated at a level sufficient to overcome the small losses resulting from the proposed operations as compared to baseline operations, as well as the sometimes substantial incidental take that occurs when harvest is allowed on unlisted sockeye in the Columbia River. Thus, the relatively small short-term impact to critical habitat resulting from the proposed action is not likely to appreciably diminish the value of critical habitat either for the survival or recovery of the ESU.

Under the Listing Condition Approach applied in Section 6.0, there is no adverse modification or destruction of critical habitat possible, because there is not likely to be any alteration of essential features of critical habitat below their condition at the time this ESU was listed.

8.14 LCR COHO SALMON

After reviewing the current status of LCR coho salmon, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries’ opinion that discretionary hydro operations are not likely to jeopardize the continued existence of this species.

Magnitude of Reduction(s): The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets is not likely to reduce numbers, productivity, diversity, or the distribution of any of the four major population groups (Section 6.0).

Number of Major Population Groups: The presence of only three major population groups in this ESU (Section 4.0) means that it is likely that the viability of each population group is significant for this ESU's survival and recovery.

Proportion of Major Population Groups Reduced: The combination of proposed hydro operations, hydro configuration changes, and non-hydro offsets would not be likely to reduce numbers, productivity, diversity, or the distribution of any of the four major population groups (Section 6.0).

Range-wide Status of the ESU: As described in Section 4.0, this ESU has been proposed as a threatened species. The BRT reported that the two populations with appreciable natural productivity experienced increased returns in 2000 and 2001 but continue to have low abundance and productivity. The BRT concluded that the natural component of the ESU had extremely high risks in all VSP categories. The June 14, 2004 status review and proposed listing determinations for salmon and steelhead indicated that LCR coho salmon artificial production programs reduce risks to ESU abundance and spatial structure, pose risks to ESU diversity, and have uncertain effects on ESU productivity. Overall, hatchery programs collectively mitigate the immediacy of ESU extinction but do not substantially reduce the extinction risk of the ESU in-total in the foreseeable future.

Status of the ESU in the Action Area (Environmental Baseline): Since all of the fish in this ESU pass through at least part of the action area, the status of the ESU in the action area is essentially the same as the range-wide status of the ESU (described in Section 4.0). Adult passage at Bonneville Dam for one MPG is effective. As described in Section 5.0, the construction of the hydro system has severely degraded habitat in the juvenile migration corridor of this ESU, resulting in high levels of mortality for juvenile fish migrating towards the ocean. Beginning in the 1980s, and especially in the last decade, the Action Agencies have made a series of structural and operational improvements at FCRPS projects, including Bonneville, and, in many cases, these modifications have significantly improved the survival of juvenile fish within this ESU during their passage through the hydro system. However, habitat-related biological requirements of juveniles are not being fully met in the action area. The significant baseline effects of FCRPS dams, USBR projects and mainstem harvest rates are key factors influencing ESU status in the action area.

Cumulative Effects: As described in Section 7.0, few actions (either adverse or beneficial) have been identified that would meet the reasonably certain to occur test and therefore qualify as cumulative effects. Nevertheless, NOAA Fisheries identified a number of state, Tribal, or private actions that have frequently occurred in the past and may well occur or even increase in the near future. Most, if not all, of these actions are harmful and have significantly contributed to the current degraded habitat. If these harmful actions were to cease when their current authorizations expire, habitat conditions would be expected to eventually improve. Due to the difficulty in

determining whether these harmful actions are “reasonably certain to occur” in the absence of further specific assistance from state, Tribal, or local governments, NOAA Fisheries has conservatively assumed that current levels of harm will continue at least through the end of the consultation period (2014). Depending on the specific action involved, this assumption both overestimates adverse cumulative effects (for authorizations that end prior to 2014) and underestimates adverse cumulative effects (for authorizations that end after 2014). The effect of this assumption is that NOAA Fisheries anticipates that the cumulative effects of state, Tribal, or private actions over the consultation period (2004-2014) will generally approximate the effects of frequently occurring past state, Tribal, or private actions that were included in the environmental baseline.

Uncertainty: There are no quantitative estimates of the effect of the proposed action on this ESU. For the few hatchery-origin populations that migrate through Bonneville pool and dam, direct juvenile survival rates are assumed to be similar to the survival rate of other yearling spring migrants (SR spring/summer chinook salmon and SR steelhead). This assumption is very uncertain. The SR spring/summer chinook and SR steelhead survival estimates represent a combination of discretionary annual operations and the environmental baseline (i.e., existence of the FCRPS and USBR projects and non-discretionary hydro operations). The precision with which NOAA Fisheries can distinguish between juvenile survival associated with discretionary annual operations and environmental baseline conditions is uncertain, because it is difficult both to describe the limits of some areas of the Action Agencies’ discretion and to define and model a reference operation that would maximize the survival of listed fish. The magnitude of latent mortality of in-river migrants, including any differences in this measure between the reference and proposed operation, is unknown. Survival of adults through the hydro system under the proposed action is relatively certain.

There are no quantitative estimates of the effect of the proposed action on this ESU below Bonneville Dam. While specific effects of hydro operations on estuary and plume habitat are uncertain, the relatively small difference in spring flows and lack of a difference in water quality between the reference and proposed operations are fairly certain. Estimates of the improvements expected from the continued and expanded pikeminnow program are uncertain for the one major population group above Bonneville Dam, but NOAA Fisheries accounted for this uncertainty by estimating only a Low survival improvement (Section 6.3.2.4). Estimates of the specific improvements expected from the avian predation program for this ESU are uncertain, because some level of compensatory mortality could occur. NOAA Fisheries evaluated the impact of a range of assumptions about compensatory mortality and found that its conclusion was fairly robust.

Summary: Because no net reduction in numbers, reproduction, or distribution is expected as a result of the combination of proposed hydro and off-site actions, the proposed action is not likely to appreciably reduce the likelihood of survival and recovery of the ESU.

9.0 CONSERVATION RECOMMENDATIONS

9.1 INTRODUCTION

This section discusses NOAA Fisheries' obligation to develop conservation recommendations under Section 7(a)(1) of the ESA, which states in part:

“All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act.”

In this Opinion, the existence of the dams and reservoirs in the FCRPS is considered part of the Environmental Baseline. As a result, NOAA Fisheries has determined that the Action Agencies are not responsible for mitigating the effects of the existence of the dams and reservoirs *in order to avoid jeopardy* under Section 7(a)(2) of the ESA.

The following conservation recommendations were developed for this Opinion.

9.2 SUBBASIN PLANNING INFRASTRUCTURE

NOAA Fisheries recommends that the Action Agencies continue to facilitate the existing subbasin planning infrastructure to ensure that subbasin plans are implemented effectively and efficiently and are updated and modified at three-year intervals using the best available scientific information.

9.3 SNAKE RIVER SOCKEYE SALMON

NOAA Fisheries recommends that a second artificial propagation facility designed to produce up to 150,000 sockeye salmon smolts be developed by the Action Agencies. This action would reduce the risk of losing an entire year-class of smolts due to disease or mechanical failure at one facility. The action would potentially double the number of anadromous sockeye salmon adults from the number proposed by the Action Agencies. An assessment at Sawtooth Hatchery could be undertaken to determine if the needed clean water supply and additional rearing space could be developed to accommodate this production.

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10.0 INCIDENTAL TAKE STATEMENT

10.1 INTRODUCTION

Section 9 of the ESA and Federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct.” Incidental take is defined as “take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.” Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA, provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described in this section are nondiscretionary and must be undertaken by the Corps, BPA, and USBR. The Action Agencies have a continuing duty to regulate the activities covered by this Incidental Take Statement. If the Action Agencies fail to assume and implement the terms and conditions of this Incidental Take Statement, the protective coverage of Section 7(o)(2) may lapse. To monitor the effect of incidental take, the Action Agencies must report the progress of the action and its effect on each listed species to NOAA Fisheries, as specified in this Incidental Take Statement [50 CFR Section 402.14(i)(3)].

10.2 AMOUNT OR EXTENT OF ANTICIPATED TAKE

10.2.1 Amount of Take

In Section 6.0, NOAA Fisheries estimated the mortality attributable to proposed hydro operation of FCRPS and 19 USBR projects. These quantitative estimates of incidental take are summarized for eight ESUs in Tables 10.1 (juvenile mortality) and 10.2 (adult mortality).). Some commentators believe that the estimate of take reflected by the Incidental Take Statement fails to account for much of the juvenile and adult mortality that was considered in the 2000 Biological Opinion. The reason why NOAA Fisheries changed its methodology for applying the Section 7(a)(2) standards from that used in the 2000 Biological Opinion is discussed in Section 1.2 of this Opinion. Estimated take is based on the difference in mortality between a reference FCRPS operation and the proposed FCRPS operation, including the transportation program and differential post-Bonneville mortality, over a variety of annual runoff conditions (see Sections 1.0, 5.0, and 6.0). This survival difference cannot be monitored directly, because only the proposed operation will be implemented. Therefore, it is impossible to determine if mortality observed at a particular location or time is the result of the discretionary operations that are part of the proposed action, or if they are the result of the existence and non-discretionary operations of FCRPS projects that are included in the hydro portion of the environmental baseline as represented by the reference operation. To monitor the amount of authorized incidental take, NOAA Fisheries will monitor the total mortality associated with FCRPS passage and juvenile transportation (i.e., mortality associated with both the discretionary proposed operations and the non-discretionary operations and existence of the dams), which is described in Tables 10.3 and 10.4. If the total FCRPS passage mortality exceeds the mortality rates in Tables 10.3 and 10.4,

NOAA Fisheries will suspect that the authorized incidental take in Tables 10.1 and 10.2 has also been exceeded to an indeterminate amount and determine whether reinitiation of consultation is necessary.

The amount of incidental take also can be estimated for some components of the monitoring and evaluation program required by the terms and conditions of this Incidental Take Statement (Table 10.5). For example, the Smolt Monitoring Program annually handles 4% to 6% of the listed fish arriving at Lower Granite, Little Goose, and Lower Monumental dams and 0.01% to 0.30% of the listed fish arriving at other FCRPS mainstem projects. Mortality of the handled fish averages less than 1%. Take associated with required monitoring programs may vary somewhat from the amount described in Table 10.5 because of annual variations in the focus of each program. As described below, NOAA Fisheries requires annual coordination to determine if the specific annual operations are consistent with the terms and conditions of this Incidental Take Statement. Although some proportion of the take associated with monitoring and evaluation is associated with non-discretionary operation and the existence of the dams, it is difficult to attempt to separate these monitoring effects and the proposed action's monitoring effects.

Table 10.1 Quantitative estimates of incidental take of juvenile salmonids migrating past FCRPS projects resulting from the proposed FCRPS actions. The amount of take is estimated as the difference between the reference operation and the proposed operation of the FCRPS (Section 6.0). Expected take is reduced by additional hydro and non-hydro actions that qualitatively increase survival.

ESU	Estimated Juvenile Mortality (%)					
	Range (2004)	Mean	Range (2010)	Mean	Range (2014)	Mean
<i>Chinook</i>						
SR spring/summer	<1-3%	1%	0-1%	0%	0%	0%
SR fall	1-4%	3%	0-3%	2%	0-3%	1%
UCR spring	2-5%	4%	<1-3%	<1%	0-<1%	2%
LCR spring	<1-2%	1%	<1-2%	1%	0-2%	1%
LCR fall	<1-4%	2%	<1-4%	2%	<1-4%	2%
UWR	N/A	N/A	N/A	N/A	N/A	N/A
<i>Steelhead</i>						
SR	<0-1%	1%	0-1%	0%	0-1%	<0%
UCR	<1-7%	5%	0-4%	2%	0-4%	<1%
MCR (JDA Dam – BON)	1-10%	5%	0-7%	1%	0-6%	<1%
LCR	<1-5%	2%	0-5%	2%	0-5%	2%
UWR	N/A	N/A	N/A	N/A	N/A	N/A
<i>SR Sockeye</i> ¹	N/A	N/A	N/A	N/A	N/A	N/A
<i>CR Chum</i>	N/A	N/A	N/A	N/A	N/A	N/A
<i>LCR Coho</i>	<1-2%	2%	<1-2%	1%	0-2%	<1%

1. Assumed to be slightly greater than the difference for SR spring/summer chinook and SR steelhead.

Table 10.2. Estimates of incidental take of adult salmonids resulting from the proposed FCRPS hydro operations. The amount of take is estimated as the difference between the reference operation and the proposed hydro operation of the FCRPS (Section 6.0). N/A = not applicable (i.e., for ESUs that do not pass FCRPS projects). Estimates for ESUs with subbasin populations that pass different numbers of dams are for the maximum number of dams passed.

ESU	Estimated Adult Mortality (%)
<i>Chinook</i>	
SR spring/ summer	0
SR fall	0
UCR spring	0
LCR spring	0
LCR fall	0
UWR	0
<i>Steelhead</i>	
SR	0
UCR	0
MCR	0
LCR	0
UWR	0
<i>Sockeye</i>	
SR	0
<i>Chum</i>	
CR	0

Table 10.3 Quantitative estimates of total FCRPS passage mortality of juvenile salmonids migrating past FCRPS projects resulting from a combination of the proposed hydro operations, which include discretionary and non-discretionary operations and the existence of the dams. If the total FCRPS mortality described in this table is exceeded, NOAA Fisheries will suspect that the authorized take in Table 10.1 is also exceeded.

ESU	Estimated Juvenile Mortality (%)					
	Range (2004)	Mean	Range (2010)	Mean	Range (2014)	Mean
<i>Chinook</i>						
SR spring/summer	47-51%	49%	45-50%	48%	44-49%	47%
SR fall (in-river only)	78-92%	86%	76-91%	85%	91-75%	84%
UCR spring	25-45%	33%	20-41%	28%	17-40%	27%
LCR spring	7-15%	101%	7-14%	10%	6-14%	9%
LCR fall	3-23%	14%	3-23%	14%	3-23%	14%
UWR	N/A	N/A	N/A	N/A	N/A	N/A
<i>Steelhead</i>						
SR	47-59%	51%	47-59%	51%	46-59%	51%
UCR	38-84%	53%	35-83%	50%	34-82%	49%
MCR (JDA Dam-BON)	12-60%	30%	9-59%	28%	8-59%	27%
LCR	5-39%	16%	4-39%	16%	4-39%	16
UWR	N/A	N/A	N/A	N/A	N/A	N/A
<i>SR Sockeye</i>						
SR	N/A	N/A	N/A	N/A	N/A	N/A
<i>Chum</i>						
CR	N/A	N/A	N/A	N/A	N/A	N/A

Table 10.4. Estimates of total FCRPS mortality of adult salmonids resulting from a combination of the proposed hydro operations, which include discretionary and non-discretionary operations and the existence of the dams. If the total FCRPS mortality described in this table is exceeded, NOAA Fisheries will suspect that the authorized take in Table 10.2 is also exceeded. Estimates for ESUs with subbasin populations that pass different numbers of dams are for the maximum number of dams passed. Effects of the Willamette Project on listed salmon in the lower Columbia River below the confluence of the Willamette River will be addressed in the Biological Opinion on the Effects of the Operation of 13 Multipurpose Dams and Maintenance of 43 Miles of Streambank Revetments, Upper Willamette Basin, Oregon.

ESU	Estimated Adult Mortality (%)
<i>Chinook</i>	
SR spring/summer	15.4% (6.4 - 25%)
SR fall	15.3% (7.7 - 20%)
UCR spring	8.0% (6.5 – 8.9%)
LCR spring	3.5% (none)
LCR fall	2.0% (none)
UWR	U
<i>Steelhead</i>	
SR	16.8% (10.1 – 25%)
UCR	5.9% (3.9 – 7.8%)
MCR (4 dams)	8.9% (none)
(3 dams)	6.7% (none)
(2 dams)	4.6% (none)
(1 dam)	2.3% (none)
LCR	2.6% (none)
UWR	U
<i>SR Sockeye</i>	16.9% (none)
<i>LCR Coho</i>	2.0% (none)
<i>CR Chum</i>	U

U = unquantifiable (i.e., for ESUs that do not pass FCRPS projects).

Table 10.5 Annual 2003 handling mortality and tagging associated with the monitoring and evaluation program for the characteristics of the various salmon and steelhead stocks in the Columbia and Snake River basins and to provide management information for implementing flow and spill measures designed to improve fish passage conditions in the mainstem lower Snake and Columbia rivers.

ESU/ Species	Life Stage	Take Activity	Estimated number of fish in 2003 (not take #)	Proportion of Listed Fish Mortality	Actual Number of Unintentional Mortality	Research Period
SR Sockeye Salmon	juvenile	Capture, Handle, Release	1,002	0.004	4	March-October
SR Spring/Summer Chinook Salmon (natural production)	juvenile	Capture, Handle, Release	2,460,172	0.00005	132	March-October
SR Spring/Summer Chinook Salmon (natural production)	juvenile	Capture, Handle/Tag, Release	2,460,172	included in the row above	included in the row above	March-July
SR Spring/Summer Chinook Salmon (artificial production)	juvenile	Capture, Handle, Release	1,747,438	0.00003	53	March-October
SR Spring/Summer Chinook Salmon (artificial production)	juvenile	Capture, Handle/Tag, Release	1,747,438	included in the row above	included in the row above	March-July
SR Fall Chinook Salmon	juvenile	Capture, Handle, Release	1,051,620	0.001	1,177	March-October
SR Steelhead	juvenile	Capture, Handle, Release	1,456,857	0.00004	53	March-October
SR Steelhead	juvenile	Capture, Handle/Tag, Release	1,456,857	included in the row above	included in the row above	March-July
UCR spring chinook salmon – Artificial	juvenile	Capture, Handle, Release	1,262,700	0.00001	7	March-October
UCR spring chinook salmon - Natural	juvenile	Capture, Handle, Release	4,644,790	0.000004	18	March-October
UCR Steelhead – Artificial	juvenile	Capture, Handle, Release			4	March-October
UCR Steelhead - Natural	juvenile	Capture, Handle, Release	670,161	0.000003	2	March-October
MCR Steelhead	juvenile	Capture, Handle, Release	362,707	0	0	March-October
LCR Chinook Salmon	Juvenile	Capture, Handle, Release	4,644,790	0	0	March-October
LCR Steelhead	Juvenile	Capture, Handle, Release	227,000	0	0	March-October

10.2.2 Hydro Juvenile Survival Performance Standard

NOAA Fisheries understands that the proposed hydro action employs an adaptive management framework for adjusting the proposed action to respond to new information. For the purposes of this Incidental Take Statement and its estimate of the amount of take, NOAA Fisheries will employ a hydro operations performance standard for juvenile survival.

The hydro operations performance standard for juvenile survival is to equal or exceeds, in any given year, the level of juvenile survival that would otherwise occur if the specific hydro operations described in the Action Agencies' Updated Proposed Action were carried out as described. This performance standard can be satisfied by alternative hydro operations or a combination of alternative hydro operations and qualifying non-hydro actions. For the purpose of meeting this performance standard, the Action Agencies can receive credit for non-hydro actions that are (1) in addition to the non-hydro actions described in this Opinion, or (2) non-hydro actions described in this Opinion that result in benefits in excess of those expected or relied upon in this Opinion, but only to the extent that such benefits exceed the benefits expected or relied upon.

Several commentators have expressed concern that the Biological Opinion allows the use of alternative measures without providing any specificity about what the measures would look like. They believe the alternative measures provision is too vague and open ended to satisfy the certainty required of the Incidental Take Statement. On the other hand, other commentators believe that Incidental Take Statement needs to accommodate an action with an expanding or contracting scope. In order to make the Biological Opinion responsive to emerging ways to better implement the action and to provide flexibility to attain the performance standards by means other than those already specified, the Incidental Take Statement would apply the following test to proposed changes in its implementation. In the case of an Action Agency proposal to implement a different operation than is described in the proposed action, compliance with the hydro operations performance standard will be determined on a prospective basis using the current year's water supply forecast and the SIMPAS model and flow-survival relationships as determined by NOAA Fisheries and as updated using the best available scientific information. In the event that this modeling predicts that the alternative hydro operations specified for the year, plus such non-hydro actions that qualify for crediting, will equal or exceed the level of juvenile survival that would otherwise occur if the hydro operation in the updated proposed action were carried out, the hydro operations performance standard for juvenile survival shall be deemed satisfied by the alternative hydro operation and qualifying non-hydro actions.

10.2.3 Incidental Take Associated with Non-hydro Activities

Proposed non-hydro activities are expected to have net beneficial effects. However, some short-term adverse effects could potentially occur, which may result in incidental take of listed species. At the moment, NOAA Fisheries does not anticipate such short-term adverse effects, and therefore this Opinion does not authorize incidental take associated with any non-hydro activities except for monitoring and evaluation. Nevertheless, as they are developing or implementing the project, the Corps or USBR may determine that some incidental take is likely. In that event, either agency may seek to supplement this Opinion.

10.3 EFFECT OF THE TAKE

Earlier in this biological opinion, NOAA Fisheries determined that the projected levels of juvenile and adult survival through the FCRPS and the projected effects of the proposed additional hydro and non-hydro offsets are not likely to result in jeopardy to any of the 13 species.

10.4 REASONABLE AND PRUDENT MEASURES

NOAA Fisheries is requiring the following reasonable and prudent measures and terms and conditions in this Incidental Take Statement. NOAA Fisheries believes these are necessary and appropriate to minimize the impacts of incidental take associated with the proposed FCRPS operation, as well as monitoring and evaluation activities sufficient to determine whether 1) the proposed action is being implemented as expected, 2) the effects of the action considered in the Opinion are occurring as expected, 3) actions to minimize take are being implemented, and 4) authorized take is not being exceeded.

10.4.1 Monitor Incidental Take

The Action Agencies will monitor the level of take associated with their proposed action and will report the results to NOAA Fisheries in a timely manner.

10.4.2 Reduce Incidental Take by Improving Juvenile and Adult Passage Survival

The Action Agencies will reduce the level of take by implementing the additional measures specified in Section 10.5.2.1 to further improve survival of juveniles and adults, in addition to measures described in the proposed action. NOAA Fisheries has determined that these additional measures specified in section 10.5 constitute only minor changes to the UPA.

10.5 TERMS AND CONDITIONS

10.5.1 Terms and Conditions Related to Monitoring Take

10.5.1.1 Terms and Conditions Related to Monitoring Take Due to Mainstem Hydro Operations

10.5.1.1.1 Evaluate Reach Survival. Annually, the Action Agencies will support NOAA Fisheries' estimation of juvenile and adult reach survivals using empirical information and modeling. In annual reports, they will compare averages (up to and including the most recent operations year) with the estimates of juvenile mortality for each ESU in Table 10.3. Results will be reported in annual progress reports and compared with in-river survival estimates for the 2004, 2010, and 2014 proposed hydro operations using study methods that will be reviewed through the Regional Implementation Forum process.

The Action Agencies, in coordination with NOAA Fisheries through the annual planning process, will continue to support and fund the monitoring of wild juvenile Snake River fall chinook survival, growth, and life history attributes. Knowledge of wild fish life history attributes is critical as a baseline comparison for studies involving juvenile hatchery fall chinook used as surrogates for wild fish and their passage timing through the FCRPS.

10.5.1.1.2 Monitor Smolt-to-adult Returns. If the decision for the long-term operation of FCRPS projects on the lower Snake River includes continued reliance on transportation, the Corps and BPA will complete ongoing transport survival studies for spring migrants passing Lower Granite Dam and McNary Dam to determine the transport operation that would provide the most benefit to transported fish.

10.5.1.1.3 Monitor Delayed Mortality. The Corps and BPA, in coordination with NOAA Fisheries through the annual planning process, will include an evaluation of D of transported fish relative to in-river migrating juvenile anadromous salmonids during all transport evaluations. Updated annual estimates of D for each transported species will be included in the annual progress reports. Compare annual or rolling averages of D with estimates in Appendix D.

10.5.1.1.4 Monitor Effects of Dissolved Gas Supersaturation. The Action Agencies will monitor the levels of total dissolved gas (TDG) and associated biological impacts in the lower Snake and lower Columbia rivers. This annual program will include water quality monitoring and will be developed and implemented in coordination with the Water Quality Team (WQT) and the mid-Columbia PUDs. The TDG pressure and percent saturation, water temperature, and barometric pressure will be sampled on an hourly basis and shared with resource agencies on a real-time basis. This information will be summarized and reviewed in the annual reports.

The water quality sampling methodology should include monitoring TDG levels throughout the Columbia River basin in river reaches. A comprehensive monitoring plan includes monitoring TDG levels in locations in coordination with the WQT for each project in critical reaches. This program will also include a QA/QC component conforming to the Data Quality Criteria developed by the Corps in coordination with the WQT. This data quality control system will involve frequent calibration and maintenance of water quality equipment, daily screening of real time data, and archival storage in a regional data base (CWMS). The QA/QC components will be reviewed annually and modified as improved information and techniques become available. The Action Agencies will conduct an annual QA/QC conference in coordination with the Water Quality Team. The biological monitoring components will include smolt monitoring at selected smolt monitoring locations and daily data collection and reporting only when TDG exceeds 125% for extended periods of time.

10.5.1.1.5. Monitor Adult Survival and Kelt Passage. The Action Agencies will estimate adult survival annually from Bonneville to Priest Rapids and Lower Granite dams for Upper Columbia and Snake River ESUs, respectively. This information will be included in the annual progress reports, including estimates in Table 10.2. The Action Agencies will complete a downstream migrant kelt assessment to determine the magnitude of passage, contribution to population diversity and growth, and potential actions to provide safe passage.

10.5.1.1.6 Report Progress in Implementing Fish Passage Plan in a Timely Manner. The current practice of providing 7-day Corps project adult/juvenile facility reports and 7-day fish transportation summaries to NOAA Fisheries via electronic mail once a week has worked well and should continue. The Corps should provide these reports to NOAA Fisheries once a year (preferably at the February FPOM meeting) in electronic format on a compact disk for archiving. Specific details should be developed in coordination with FPOM.

The Action Agencies, in coordination with the annual planning process, will continue to provide weekly and annual reports regarding implementation of the fish passage plan to FPOM.

10.5.1.2 Monitoring Incidental Take Due to Beneficial Effects of Non-hydro Actions

10.5.1.2.1. Monitoring and Reporting to Confirm Impacts of the Fish Predation Reduction Program . In annual reports, the Action Agencies will report progress in implementing the expanded pikeminnow predation reduction program to demonstrate consistency with the proposed schedule.

The Action Agencies will monitor changes in pikeminnow production rates to ensure consistency with NOAA Fisheries' assumptions for improvements. This information will be included in the annual progress reports.

10.5.2 Terms and Conditions Related to Improving Juvenile and Adult Passage

10.5.2.1 Additional Measures to Minimize Incidental Take

1. The Action Agencies will continue to refine the SYSTDG gas model and its use as a river operations management tool. SYSTDG applications and results will be coordinated through the Water Quality Team, the Technical Management Team, the Transboundary Gas Group and the Mid-Columbia Public Utility Districts.
2. The Action Agencies will continue to refine a water quality model that addresses Columbia and Snake river mainstem river temperature monitoring and meteorological data. The model will initially be applied to river management decisions for the lower Snake River. The Action Agencies will continue to develop an expanded data gathering network and strategy compatible with the model requirements.
3. The Action Agencies will evaluate juvenile project-specific passage survival both before and after configuration and/or operational modifications, to ensure that these modifications result in improved passage survival compared with the survival expected under the 2004 proposed operation.
4. The Action Agencies will continue to assess and enumerate pre-spawning mortality and reduced spawning success of adult upstream-migrating fish, which may be due to or exacerbated by passage through the FCRPS hydro projects. If measures are identified which will reduce the pre-spawning mortality rate, the Action Agencies will implement these measures as warranted.

Before any research, monitoring or evaluation study authorized through the Corps and BPA regional planning processes is initiated, NOAA Fisheries must determine on an annual basis whether the study's anticipated take of listed fish is within acceptable limits and if the research is necessary to implement the Opinion and UPA. The determinations are intended to be used only for FCRPS hydro-related research, monitoring and evaluation activities that are reviewed in (a) the Corps' Anadromous Fish Evaluation Program (AFEP) process and (b) the Northwest Power and Conservation Council's Fish and Wildlife Program provincial review process and funded by BPA. The determinations are not intended to be used for RM&E mitigation-related research involving tributary and estuary habitat, hatchery and harvest activities, or other actions, such as dredging.

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11.0 MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT

11.1 BACKGROUND

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§ 305(b)(2)).
- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§ 305(b)(4)(A)).
- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries' EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§ 305(b)(4)(B)).
- EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA § 3). For the purpose of interpreting this definition of EFH: waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 C.F.R. 600.10). "Adverse effect" means any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 C.F.R. 600.810).
- EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action as described in the Action Agencies' UPA would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

11.2 IDENTIFICATION OF EFH

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Federally managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999) and longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California north of Point Conception to the Canadian border. Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information. For purposes of this analysis, this Opinion addresses potential effects to chinook and coho salmon.

Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon, and California, and seaward to the boundary of the U.S. exclusive economic zone (596 miles) (PFMC 1998a, 1998b).

Detailed descriptions and identifications of non-salmonid EFH are contained in the fishery management plans for groundfish (PFMC 1998) and coastal pelagic species (PFMC 1998a). Casillas *et al.* (1998b) provide additional detail on the groundfish EFH habitat complexes. NOAA Fisheries has identified seven groundfish habitat complexes (estuarine, rocky shelf, non-rocky shelf, neritic zone, oceanic zone, continental slope/break and canyon) and identified species that may occur in each of those areas. The estuarine complex, which (with the neritic zone) is pertinent to this consultation, includes those waters, substrates and associated biological communities within bays and estuaries of the EEZ, from mean higher high water level (MHHW) or extent of upriver saltwater intrusion to the respective outer boundaries for each bay or estuary, as defined in 33 CFR 80.1 (Coast Guard lines of demarcation). The neritic zone is the relatively shallow ocean that extends from the outer edge of the intertidal zone to the edge of the continental shelf. It therefore contains the Columbia River plume. Two groundfish, two coastal pelagic, and two salmon species (chinook and coho) are included in the action area for the UPA (Table 11.1).

Table 11.1. Non-salmonid Fish Species with EFH in the action area for operation of the FCRPS and 19 USBR projects in the Columbia basin.

Species	Habitat Preferences
Starry Flounder <i>Platichthys stellatus</i>	mud, sand; often found in estuaries and upstream in freshwater
English sole <i>Pleuronectes vetulus</i>	sand, mud
Northern Anchovy <i>Engraulis mordax</i>	pelagic
Pacific Sardine <i>Sardinops sagax</i>	pelagic

Source:

Casillas, E., L. Crockett, Y. deReynier, J. Glock, M. Helvey, B. Meyer, C. Schmitt, M. Yoklavich, A. Bailey, B. Chao, B. Johnson, and T. Pepperell, 1998. Essential Fish Habitat West Coast Groundfish Appendix. Seattle, Washington, National Marine Fisheries Service: 778 pp.
 Emmett, R. L., S. L. Stone, et al. (1991). Distribution and abundance of fishes and invertebrates in west coast estuaries, Volume II: Species life history summaries. Rockville, MD, NOAA/NOS Strategic Environmental Assessments Division: 329.

11.3 PROPOSED ACTION

For this EFH consultation, the proposed action and action area are described in the Action Agencies' November 2004 Updated Proposed Action (UPA) and previously in Section 5.0 of this Opinion, respectively. The action area is in portions of the states of Oregon, Washington, and Idaho that are also within the range of essential fish habitat (EFH) designated under the MSA. The action area relative to both juvenile and anadromous salmonids is that part of their in-water and riparian habitat that would be affected by the proposed operation of the FCRPS dams and 19 USBR projects and the non-hydro offsets described in the UPA. This area serves as a migratory corridor for juveniles and adults of five ESA-listed species of chinook salmon (SR spring/summer and fall chinook salmon, UCR spring chinook salmon, UWR chinook salmon, and LCR chinook salmon) and one species of coho salmon (LCR coho) that is proposed for listing, all of which are considered in this Opinion. The area serves to a varying extent as habitat for spawning, rearing, and growth and development to adulthood for these salmonids. EFH is also designated in the action area for unlisted species of chinook salmon: the Deschutes River summer/fall-run, mid-Columbia River (MCR) spring-run, and UCR summer/fall-run chinook ESUs. The proposed action includes the effects of flow on essential fish habitat in areas of the Columbia River estuary and plume used by groundfish and coastal pelagic species for which EFH is designated.

11.4 EFFECTS OF PROPOSED ACTION

As described in Section 6.0 of this Opinion, the continued proposed operation of the FCRPS dams and 19 USBR projects and the non-hydro offsets may result in short- and long-term impacts, both positive and negative, to a variety of habitat parameters. The adverse impacts to EFH for both listed and unlisted chinook and proposed coho salmon are the same as those described for ESA-listed salmonids. Therefore, the ESA effects analysis in this Opinion addresses impacts of the proposed action to salmon EFH. As described in the following sections,

the proposed operation of the FCRPS dams and 19 USBR projects is likely to negatively affect some properties of designated EFH.

11.4.1 Effects on Mainstem Habitat Conditions, Including the Estuary and Plume

11.4.1.1 Effects of Flow Management on EFH

11.4.1.1.1 Effects of Flow Management on EFH for Salmonids. Compared to the reference operation, the proposed action would slightly reduce flows in the lower Columbia River during the spring (Section 6.2.1.1 and Table 6.3). During this period, yearling migrant SR spring/summer chinook, Deschutes River summer/fall chinook, UCR spring chinook, and MCR spring chinook, and yearlings from the Hood, Sandy, and Kalama river populations of (spring-run) LCR chinook salmon are migrating through the action area. Because the difference in spring flow is minimal, the proposed action is not likely to have more than a minimal effect on the functioning of either the migration corridor or juvenile rearing habitat during this period.

Summer flows below Bonneville Dam would be significantly lower under the UPA than under the reference operation (Section 6.2.1.1 and Table 6.3). Snake River fall chinook and UCR summer/fall chinook produce subyearlings that migrate through and rear within the mainstem during summer, as do migrants from many populations of LCR (fall-run) chinook salmon. The acreage of shallow-water estuarine rearing habitat available under the proposed summer operation would be similar to that available under the reference operation, but with differences greatest in the upstream tidally influenced reach closest to Bonneville Dam. Fall and winter flows associated with the proposed hydro operation would be somewhat higher than those associated with the reference operation, but it is unlikely that the higher flows would have a significant effect on mainstem spawning of SR fall chinook salmon.

Some water quality conditions associated with the proposed hydro operation could decline with lower flows during summer months. Higher summer water temperatures would most likely affect migrating juvenile SR fall chinook salmon and some populations of rearing LCR fall chinook. Additionally, warmer summer temperatures could affect migrating adult chinook salmon from several ESUs.

11.4.1.1.2 Effects of Flow Management on EFH for Groundfish. Two groundfish species, the starry flounder and English sole, are likely to have designated essential fish habitat in areas affected by the proposed action. Starry flounder spawn in the ocean, and juveniles enter the estuary at a young age where they are associated with the bottom, feeding on amphipods and copepods (Fox et al. 1984). They are distributed throughout the estuary but younger fish (less than 2 years) are more concentrated in the freshwater or low salinity areas. Fish older than 2 years are more concentrated in areas of higher salinity. During spring, abundance is generally low and flounder are restricted to part of Youngs Bay and an area between Tongue Point and Woody Island (approximately RM 29). During summer and fall, they are more widely distributed but are most abundant in areas of low velocity currents such as Grays Bay, Youngs Bay, Baker Bay, Cathlamet Bay, and intertidal habitats, where their principal prey, amphipods, concentrate.

The English sole is a marine species that is associated with the bottom for most of its life cycle. It prefers high salinities and therefore is found only in the downriver portions of the estuary where the population, primarily juveniles, feed and rear (Fox *et al.* 1984). English sole eat mainly copepods, amphipods, and mysids, but also incorporate the clam *Macoma balthica*, polychaetes, and oligochaetes into their diet. Sole less than one year old are localized in low-velocity, shallow areas such as the Ilwaco and Chinook channels during spring but are distributed further upriver in relatively saline water during summer and fall. Both their relative abundance and distribution in the estuary decrease in winter. Relatively few of the individuals in the estuary are one year old or older, and these are found downriver from the Astoria-Megler bridge year-round.

Both species are associated with low-velocity, shallow-water habitat in the estuary, where their prey are abundant. Thus, effects on estuarine EFH are likely to be similar to those described in Section 11.4.1.1.1 for subyearling salmon. That is, the difference between flows in the lower Columbia River under the two operations will be small during spring but more significant during summer. In terms of the acreage of shallow-water low-velocity habitat, the two operations will be similar, with differences greatest in the upstream tidally influenced reach closest to Bonneville Dam.

11.4.1.1.3 Effects of Flow Management on EFH for Coastal Pelagic Species. Northern anchovy are distributed from the Queen Charlotte Islands, British Columbia, to Magdalena Bay, Baja California, and anchovy have recently colonized the Gulf of California (PFMC 1998c). The population is divided into northern, central, and southern subpopulations, or stocks. The southern subpopulation is entirely within Mexican waters. The central subpopulation, which supports significant commercial fisheries in the U.S. and Mexico, ranges from approximately San Francisco, California to Punta Baja, Baja California. The bulk of the central subpopulation is located in the Southern California Bight, a 20,000-square-nautical-mile area bounded by Point Conception, California in the north and Point Descanso, Mexico (about 40 miles south of the U.S.-Mexico border) in the south. The geographic distribution of northern anchovy has been more consistent over time and is more nearshore than the geographic distribution of Pacific sardine.

The northern anchovy is commonly found both within the Columbia River estuary and offshore in large schools during all seasons. Adults spawn in the ocean, but all life stages can be found in the estuary where they feed mostly on copepods (and some phytoplankton) in the water column (Fox *et al.* 1984). Fish older than one year prefer higher salinity areas and are found further upriver when outflow is lower.

It is generally accepted that sardine off the West Coast of North America form three subpopulations or stocks: a northern subpopulation (northern Baja California to Alaska), a southern subpopulation (off Baja California), and a Gulf of California subpopulation. A fourth, far northern, subpopulation has also been postulated (PFMC 1998c). Although the ranges of the northern and southern subpopulations overlap, the stocks may move north and south at similar times and not overlap significantly.

Pacific sardines are pelagic at all life history stages. They occur in estuaries, but are most common in the nearshore and offshore domains along the coast. They have been captured in both purse and beach seines in the Columbia River estuary, often with anchovies. Like the northern anchovy, sardines are planktivorous, consuming both phytoplankton and zooplankton.

The difference between flows in the lower Columbia River under the proposed and reference operations would be small during spring but more significant in summer. For pelagic species, the reduction in summer flows means that the aerial extent of the low salinity environment in the plume will also be reduced. However, there is little information regarding the manner in which coastal pelagic species use features of the estuary or plume environment or how habitat use is affected by changes in flow on the order of the difference between the reference operation and the proposed action.

11.4.1.2 Effects of John Day Reservoir Elevation on EFH for Salmonids

The proposed action would raise the elevation of the John Day pool from minimum operating pool (MOP) to the minimum elevation required for irrigation withdrawals (Section 6.2.1.2). Ocean-type SR fall chinook rear primarily in lower Snake River reservoirs, particularly Lower Granite pool, and these fish have migration rates similar to spring migrants through the lower Columbia River during the summer months. This operation is expected to have a minor impact on the rearing habitat for SR fall juvenile chinook in this area, which has already been significantly modified from riverine conditions by the existence of John Day Dam and Reservoir.

11.4.1.3 Effects of Spill Operations on EFH for Salmonids

Compared to the reference operation, the proposed hydro operation would reduce spill at all FCRPS mainstem dams. The reduction in spill is particularly noteworthy during the spring migration period at Little Goose, McNary, and John Day dams, all of which are limited to a 12-hour spill operation for fish passage in the proposed action. Reduced spill primarily affects the ability of juvenile migrants to safely pass dams, which function as partial barriers to migration and can also result in migration delays. Reducing spill would decrease the functioning of migration corridor habitat. However, increases in spill efficiency through the installation and use of forebay guidance devices or removable spillway weirs, as proposed for the long-term hydro operation, would be expected to diminish the overall impacts of reducing spill from the reference operation.

11.4.2 Effects of Habitat Restoration Activities on Tributary and Estuarine Conditions

The Action Agencies propose habitat restoration activities in spawning and rearing tributaries and in the estuary to offset effects of hydrosystem operations. The proposed activities may result in short-term adverse effects on a variety of habitat parameters that influence the viability of salmonid, groundfish, and coastal pelagic species. Potential effects on habitat include:

- Temporary loss of riparian/estuarine function in areas under consideration
- Short-term increases in turbidity pursuant to the construction activities

- Potential introduction of pollutants into waterbodies during construction
- Potential modification of stream morphology in ways that are inadvertently detrimental to fish.

The long-term effects of these projects are expected to be positive.

11.4.3 Effects of Predator Control on EFH

11.4.3.1 Effects of Predator Control on EFH for Salmonids

Prior to the Action Agencies' instituting the Northern Pikeminnow Management Program (NPMP), this predator accounted for approximately 8% of the predation-related mortality of juvenile salmonid migrants in the Columbia River basin (Section 6.3.2.4). The existing NPMP, which the Action Agencies propose to continue, has reduced the pikeminnow predation-related mortality rate to approximately 6%. The Action Agencies propose to expand the NPMP, which would result in an approximately 0.6% further reduction in predation-related mortality to an estimated 5.4%. The Action Agencies estimate that this reduction applies to all the salmonid ESUs.

The Action Agencies also propose to implement additional Caspian tern management actions to reduce predation of juvenile salmonids in the Columbia River estuary consistent with the preferred alternative in the forthcoming joint Corps/USFWS/NOAA Fisheries Final Environmental Impact Statement (FEIS) on Caspian tern management. The draft joint Corps/USFWS/NOAA Fisheries EIS on Caspian tern management is currently available for public review and comment. The implementation schedule assumes that a Record of Decision (ROD) for the Caspian Tern EIS between the Corps and USFWS will be signed in February 2005. Based on the projected levels of tern colony size resulting from implementation of alternatives C and D of the draft EIS, NOAA Fisheries estimates the survival improvements for Columbia basin salmonids shown in Table 6.11.

11.4.3.2 Effects of Predator Control on EFH for Groundfish and Coastal Pelagic Species

Roby *et al.* (2002) reported that Caspian terns nesting on East Sand Island consumed sardines, anchovies, and unidentified flounder (potentially starry flounder). Therefore, implementation of the UPA (relocation of Caspian terns outside the Columbia River estuary) would probably reduce predation rates on these species, as well as listed salmonids.

11.5 CONCLUSION

NOAA Fisheries concludes that the Updated Proposed Action would adversely affect EFH for Columbia basin chinook and coho salmon, English sole, starry flounder, the northern anchovy, and the Pacific sardine.

11.6 EFH CONSERVATION RECOMMENDATIONS

Pursuant to the § 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies, including itself, regarding actions that would adversely affect EFH. The applicable conservation measures described in the Updated Proposed Action dated November 24, 2004 will be implemented by the Action Agencies. These measures, as well as those terms and conditions outlined in Section 10.0 of this Opinion, are generally applicable to designated EFH for chinook and coho salmon, English sole, starry flounder, northern anchovy, and Pacific sardine and together, address these adverse effects to the extent practicable. Consequently, NOAA Fisheries recommends that both the UPA and the terms and conditions in Section 10.0 be adopted as EFH conservation measures.

11.7 STATUTORY RESPONSE REQUIREMENT

Pursuant to the MSA (§ 305(b)(4)(B)) and 50 C.F.R. § 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. In case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

11.8 SUPPLEMENTAL CONSULTATION

The Action Agencies must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 C.F.R. 600.920(k)).

12.0 REINITIATION OF CONSULTATION

12.1 GENERAL CONSIDERATIONS

Consultation must be reinitiated if the amount or extent of taking specified in the incidental take statement is exceeded or is expected to be exceeded; if new information reveals effects of the action that may affect listed species in a way not previously considered; if the action is modified in a way that causes an effect on listed species that was not previously considered; or if a new species is listed or critical habitat is designated that may be affected by the action (50 C.F.R. Section 402.16).

These general conditions apply as well to prospective agreements, plans, and contracts that the Action Agencies use to plan for operation of, or to actually operate, the FCRPS and USBR projects and to coordinate operations with Canada and regional utilities. Examples include implementation of the Columbia River Treaty between the United States and Canada, such as adopting assured operating plans and detailed operating plans; arranging with Canada for release of non-Treaty storage; and renewing and revising the Pacific Northwest Coordination Agreement.

To the extent that prospective agreements are used to achieve operations that are in accordance with this Opinion, including its terms and conditions, the effects of those prospective agreements on listed fish have been considered in this Opinion. To the extent that proposed agreements impact FCRPS or USBR operations that affect listed fish in ways not considered in this Opinion or have provisions that go beyond implementing the operations specified in the Opinion, those proposed actions may require separate consultation or reinitiation of this consultation.

12.2 COMPREHENSIVE EVALUATIONS AND PERFORMANCE STANDARDS

In addition to the general conditions described above, this Opinion compares the Action Agencies' performance with the performance standards described in Section 6.2.3. For 2007 and again for 2010, the Action Agencies will report on their cumulative progress in achieving all of these standards.

If NOAA Fisheries determines that the Action Agencies' performance does not meet these standards, NOAA Fisheries will evaluate whether supplemental consultation or reinitiation of this consultation will be recommended. Factors to consider in this decision include evaluating whether the Action Agencies have adequately adjusted their next implementation plan to meet the standard within the expectations of this consultation, whether a shortcoming in one performance standard is balanced by their exceeding expectations in another, the significance of not meeting the standard, and the effect of not meeting the standard on the regulatory reasons for reinitiation of consultation. As part of this review, NOAA Fisheries would consider the following information pertaining to performance (sections 12.2.1 through 12.2.3) in deciding whether to recommend supplemental consultation or reinitiation of consultation.

12.2.1 Hydro Operations Juvenile Performance Standard for Comprehensive Evaluations

In response to the Action Agencies' 2007 progress report, NOAA Fisheries will determine whether empirically estimated in-river survival rates, coupled with updated model analyses that include transport survival, result in system survival rates in 2005-2007 for yearling chinook and steelhead ESUs that equal or exceed the system survival rates displayed in Table 6.5. Empirically estimated in-river survival rates in 2005-2006 will be coupled with updated model analyses to derive estimates of system survival to Bonneville Dam (excluding "D") for subyearling chinook ESUs. The mean and annual estimates for available years will be compared to the mean and range of estimates (for comparable water years) in Table 6.5. In response to the Action Agencies' 2010 progress report, the same approach, comparing them with system survival mean and range of estimates (for comparable water years) in Table 6.5, will be used to estimate system survival rates in 2005-2009 for all ESUs. Additionally, NOAA Fisheries will compare the system survival rates in 2010 for yearling chinook and steelhead ESUs to the system survival mean and range of estimates (for comparable water years) in Table 6.6.

In addition, as part of the 2007 and 2010 reviews, the Action Agencies and NOAA Fisheries will consider new scientific information on juvenile survival. NOAA Fisheries will review the relevance of that information to the estimated survival for the Proposed Action and the reference operation in this Opinion. If NOAA Fisheries concludes that these system survival rates do not equal or exceed the expected juvenile system survival rates, NOAA Fisheries would conclude that the Hydro Operations Juvenile Performance Standard for the Comprehensive Evaluation would not be met.

12.2.2 Hydro Operations Adult Performance Standard for Comprehensive Evaluations

In December 2007 and December 2010, NOAA Fisheries will determine whether adult survival rates for each ESU in 2005-2007 and 2005-2009, respectively, continue to equal or exceed the mean rates displayed in Table 6.4. The mean and annual estimates for available years will be compared to the mean and range of estimates (for comparable water years) in Table 6.4.

In addition, as part of the 2007 and 2010 reviews, the Action Agencies and NOAA Fisheries will consider new scientific information on adult survival. NOAA Fisheries will review the relevance of that information to the estimated survival for the Proposed Action and the reference operation in this Opinion. If NOAA Fisheries concludes that the empirically derived survival rates for the applicable years are not continuing to equal or exceed the expected adult survival rates (Table 6.4), NOAA Fisheries would conclude that the Hydro Operations Adult Performance Standard for the Comprehensive Evaluations would not be met.

12.2.3 Non-Hydro Performance Standards

For some ESUs, the FCRPS hydro performance standards described in Tables 6.4, 6.5, and 6.6 were not sufficient to avoid jeopardy without additional non-hydro improvements.

12.2.3.1 Tributary and Estuary Habitat Offsets

In response to the Action Agencies' 2007 and 2010 progress reports, NOAA Fisheries will evaluate the magnitude of improvements that have been achieved by determining whether implementation of tributary habitat actions results in equaling or exceeding the three- and six-year metric goals identified for the specific UCR ESU. Similarly, NOAA Fisheries will evaluate whether the proposed estuary restoration actions are being implemented, as identified by the Proposed Action under Estuary Habitat Actions. If NOAA Fisheries concludes that metric goals and estuary projects have not been achieved, NOAA Fisheries would conclude that the tributary or estuary habitat performance measures would not be met.

12.2.3.2 RME

In response to the Action Agencies' 2007 and 2010 progress reports, NOAA Fisheries will determine whether the RM&E program has been implemented in accordance with the commitments described in the Proposed Action. If NOAA Fisheries concludes that RM&E program elements have not been fully established and implemented as expected, NOAA Fisheries would conclude that the RM&E necessary to support performance would not be met.

12.2.3.3 Terns

In response to the 2007 and 2010 reports, NOAA Fisheries will consider the status of implementation actions for estuary Caspian tern redistribution identified in the UPA relative to anticipated benefits of those actions assumed in this Opinion. If NOAA Fisheries concludes that East Sand Island tern predation rates are greater than those anticipated in Appendix E of this Opinion in December 2010, NOAA Fisheries would conclude that the tern predation performance measure would not be met.

12.2.3.4 Northern Pikeminnow Management Program

The Action Agencies have proposed a program that will achieve a range of annual exploitation rates of 14% to 16 % of the targeted size class (greater than or equal to 200 mm). In December 2007 and December 2010, NOAA Fisheries will determine whether the Action Agencies have achieved an average annual exploitation rate over the applicable years of at least 15% for the targeted size class. If the average exploitation rate over the applicable years is less than 15%, NOAA Fisheries would conclude that this performance standard would not be met.

12.2.3.5 Snake River Sockeye Salmon Artificial Propagation Program

The Action Agencies have proposed a program that will expand the current captive brood stock safety-net program to include development of artificial propagation facilities to produce up to 150,000 smolts for release into Idaho's Sawtooth Valley. In December, 2008 NOAA Fisheries will determine whether the Action Agencies have achieved a 150,000 smolt release into the Sawtooth Valley lakes. By December, 2010 Bonneville will work with NOAA Fisheries and the State and Tribal Fishery managers to assist in development of reasonable measures to assure adequate adult returns to the Sawtooth Valley from the 150,000 smolt program. NOAA Fisheries

would conclude that this performance standard would not be met if fewer than approximately 150,000 sockeye salmon smolts are annually released in 2008 or subsequent years.

12.2.3.6 Snake River Fall Chinook Salmon Artificial Propagation Program

The Action Agencies have proposed to continue operating the Nez Perce Tribal hatchery fall chinook program and update adult salmon and steelhead collection facilities at Lower Granite Dam. Adult collection facilities at Lower Granite Dam support brood stock collection for the hatchery program, remove of out of basin strays, support research, and improve accuracy of monitoring ESU status. In December, 2005 and 2006 NOAA Fisheries will determine whether the Lower Granite adult trap has been operated at current capacity. In December, 2006 NOAA Fisheries will determine whether the Lower Granite Trap has been improved to allow collection of approximately 6,000 adult fall chinook salmon (or approximately 30% of the run). Beginning in December, 2007 NOAA Fisheries will determine whether the Lower Granite Adult trap is being operated to collect up to 6,000 adults or approximately 30% of the run. NOAA Fisheries would conclude that this performance standard was not met if the Lower Granite adult trap was operated below current capacity in 2005 and 2006, adult trap was not improved in 2006, and trap was not operated to annually handle up to 6,000 fall chinook salmon adults by 2007.

12.4 SUPPLEMENTAL CONSULTATIONS

The proposed action in this Opinion anticipates specific projects to provide non-hydro mitigation. Details of those projects will be provided in the annual plans described in Section 6.2.3. When the details are available, formal or informal supplemental consultation may be necessary to consider the effects of those projects and, if appropriate, authorize any incidental take.

In addition, the USBR and NOAA Fisheries are engaged in supplemental consultations concerning certain of its irrigation projects that may have local effects on listed species. NOAA Fisheries' consideration of additional information from these consultations may necessitate formal or informal supplemental consultation.

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